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# **CAP REPAIR 100% DESIGN**

**BLACKWELL FOREST PRESERVE LANDFILL  
DUPAGE COUNTY, ILLINOIS**

**JUNE 1997**

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**PREPARED FOR:  
FOREST PRESERVE DISTRICT  
DUPAGE COUNTY, ILLINOIS**

...

**PREPARED BY:  
MONTGOMERY WATSON  
ADDISON, ILLINOIS**

**PROJECT NO. 1252008.04090045**



**MONTGOMERY WATSON**

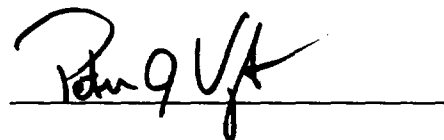
# **CAP REPAIR 100% DESIGN**

## **BLACKWELL FOREST PRESERVE LANDFILL DUPAGE COUNTY, ILLINOIS**

**JUNE 1997**

A handwritten signature in dark ink, appearing to read 'Walter Buettner', is written over a horizontal line.

**Walter Buettner, P.E.  
Project Manager**

A handwritten signature in dark ink, appearing to read 'Peter J. Vagt', is written over a horizontal line.

**Peter J. Vagt, CPG, Ph.D.  
Project Coordinator**

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## INTRODUCTION

### GENERAL

This Expedited Cap Repair 100% Design (Design) has been prepared by Montgomery Watson, on behalf of the DuPage County Forest Preserve District (FPD) of DuPage County, Illinois, for the Blackwell Forest Preserve Landfill (landfill). Refer to Figure 1 for the landfill site location. The Design is submitted to meet the objectives required by the Scope of Work (SOW) (Appendix A to the Administrative Order by Consent (AOC) between the United States Environmental Protection Agency (U.S. EPA) and the FPD, U.S. EPA Docket No. V-W-'96-C-341, March 7, 1996).

The response actions specified in the AOC, and selected for implementation at the site, include landfill cap evaluation and repair, leachate extraction and disposal, gas venting, and the assessment and implementation of groundwater and leachate monitoring. The Work Plans addressing the required response actions have been split into the following components:

- 1) Installation of the leachate extraction wells;
- 2) Design of the Leachate Collection System (LCS); and
- 3) The Predesign Investigation and Cap Repair Design.

This submittal addresses only the Cap Repair Design. All other required work plans and reports have been completed and have been submitted to the U.S. EPA under separate covers. The leachate extraction wells were previously installed in June 1996, and the Predesign Investigation was undertaken in two phases, the first in October 1996 and the second in March 1997. The Predesign Investigation results are presented in the April 1997 Predesign Report. The Expedited Final LCS Design was presented in a May 1997 report.

### SITE DESCRIPTION

The landfill is located approximately 6 miles southwest of downtown Wheaton, Illinois in Section 26, Township 39 North, Range 9 East, DuPage County, Illinois. The Blackwell Forest Preserve encompasses 1200 acres of woodlands, grasslands, wetlands, and lakes. The landfill covers approximately 40 acres in the central part of the preserve.

## **SITE HISTORY AND BACKGROUND INFORMATION**

The 40-acre tract which was developed into the landfill was purchased by the Forest Preserve District (FPD) in 1960. Over the following five-year period, approximately 1,100 additional acres were acquired by the FPD. The property was purchased with the intent of developing it as a forest preserve for recreational purposes, after construction of the landfill.

Originally, the FPD intended to use an abandoned gravel pit at the preserve for solid waste disposal. However, this plan was abandoned and in 1963, gravel excavation was resumed and continued until July of 1969.

During the course of the gravel mining, the lakes at the site were enlarged and deepened. The mined materials were sold to fund the lake construction, recreational projects, and flood control projects.

The intent was to construct a landfill that would limit the effects of waste disposal on the surrounding area, create a hill within the preserve which could be used for recreational purposes, and provide an economical means of constructing the lakes at the preserve. Therefore, the concept of landfilling in the gravel pit was abandoned. Excavation of the lakes would provide clay materials which could be used in construction of an environmentally secure landfill.

Concern regarding the suitability of the site for landfilling was expressed by several parties, including the Illinois State Geological Survey (ISGS), the Illinois Sanitary Water Board, and Northeastern Illinois Planning Commission (NIPC) personnel. These concerns centered on the site's geologic and hydrogeologic characteristics, including its position on the edge of the Warrenville cone of depression, extensive sand and gravel deposits in the area, and potential hydraulic connection between the recreational lakes and the buried refuse. In response to ISGS suggestions that careful engineering procedures would be necessary to develop a secure landfill at the site, the County Board of Commissioners approved development of an engineering plan for the project.

### **Landfill Design and Construction**

Preliminary design specifications for the landfill were developed by William Rose and Associates (Rose) for DuPage County and submitted in October 1966. Rose recommended that the landfill cover a 35-acre area, that a three-to-one clay-to-refuse placement ratio be employed, and that the fill area be constructed as a honeycomb of one-acre cells. Each cell would have a 1.5-ft thick clay base and a perimeter clay berm 8 to 9 ft in height. Each cell would be filled with two 3-ft lifts of refuse, separated by 6 in. of clay. Each cell would be covered by 1.5 ft of clay, which would form the base of the overlying cell. The cells were to be offset to maximize stability in the landfill design. The cover design specified a final 12-ft layer of compacted clay, covered by soil and vegetation.

Construction of the landfill was performed as a joint effort between the DuPage County Public Works Department (PWD) and the FPD. Under the agreement between the agencies, the PWD was to build the landfill, under supervision by the FPD.

Construction of the landfill commenced in 1965. By 1967, the shape of the hill and general cell layout had been determined. The original landfill cell configuration consisted of eight cells. Cell 9 was not part of the original planned design. (See the Remedial Investigation Report, Warzyn, December 1994.)

The original layout of the landfill was generally followed. Daily records were not kept to detail how the construction proceeded. However, in general it was the procedure to develop cells several acres in size by building side berms, and then fill the cells with refuse and daily cover. At the completion of each cell, the clay cover was installed and side berms were constructed for the next lift of refuse. The clay covers on each cell served as the liner for the next overlying cell, as the landfill construction proceeded upward.

The final load of refuse was accepted at the landfill in October 1973, and was buried just below an 800-ft Mean Sea Level (MSL) elevation in the Cell 4 area. Final contouring and landscaping continued until July 1975. Forty to sixty feet of clay were added to form the final hilltop at 839 ft MSL, approximately 150 ft above the surrounding natural topography. The landfill was covered to final grades with 2 to 15 ft of predominantly clay cover. Some areas of cover are underlain by layers of varying sand, gravel and clay composition. A final layer of a minimum of 4 to 6 in. of clayey topsoil was installed and vegetated.

The landfill contains approximately 1.5 million cubic yards of refuse, classified as general household refuse and light industrial waste, and an equal volume of natural fill. Specific wastes known to have been disposed of at the landfill include:

- Eight thousand tons of dry sludge from the Metropolitan Sanitary District of Greater Chicago
- Daily trash from Owens-Illinois of St. Charles, Illinois glass manufacturing facility
- Plant trash from Kroehler Manufacturing of Naperville, Illinois
- Burnt tree cuttings and grass clippings

The landfill covers approximately 40 acres. The addition of several cells around the eight original cells increased the planned 35-acre landfill area to the existing 40 acres. These exterior cells were used for disposing of construction debris and tree trunks and branches and may not have been constructed with clay liners.

#### **Post-Construction History**

In March 1986, the site was evaluated by the U.S. EPA using the Hazard Ranking System (HRS). A composite score of 35.57 was assigned, with the following scores assigned to

each potential route: Surface Water 0.0; Air 0.0; and Groundwater 61.54. The site was proposed for inclusion on the National Priorities List (NPL) in the Federal Register, Volume 53, Number 122, dated June 24, 1988.

On September 25, 1989, an Administrative Order on Consent (AOC) was signed between the FPD of DuPage County and the U.S. EPA. The landfill received final listing on the NPL in the Federal Register, Volume 55, Number 35, dated February 21, 1990. Subsequent to the final listing on the NPL a Remedial Investigation/Feasibility Study was performed at the landfill.

### **EXPEDITED 100% DESIGN**

The SOW for the Blackwell Landfill originally required that the cap repair design be submitted for U.S. EPA approval and comment at the 30%, 95% and 100% design stages. However, the U.S. EPA, Illinois Environmental Protection Agency (IEPA), and FPD expressed a desire to expedite the cap repair design so that both cap repair and LCS construction could be completed during the 1997 construction season. On April 23, 1997, Montgomery Watson, on behalf of the FPD, presented a conceptual plan and schedule to the U.S. EPA and IEPA for an expedited cap repair design. This conceptual plan and schedule required that the U.S. EPA waive the requirements for the 30% and 95% design submittals, and require only the 100% design submittal. The proposed components of the 100% design submittal were also presented to the Agencies.

At the April 23, 1997 meeting, the U.S. EPA agreed to consider the expedited cap repair process. This Cap Repair 100% Design submittal is the first and only expedited deliverable for the design

This Design Report is divided into the following sections and appendices.

- Section 1 - Introduction, presents the Site History and Background;
- Section 2 - Cap Repair 100 % Design, describes the Cap Repair components and implementation strategy;
- Section 3 - Reports and Submittals, discusses the proposed project submissions;
- Section 4 - Project Schedule and Personnel, discusses the proposed project schedule (Figure 2) and the organization of the proposed key personnel responsible for implementing the response actions (Figure 3);
- Appendix A presents geotechnical results on clay borrow material;
- Appendix B presents constructions specifications;
- Appendix C presents Addendum No. 1 to the Site Safety Plan;
- Appendix D presents Addendum No. 1 to the Construction Quality Assurance Plan;
- Appendix E presents Addendum No. 2 to the Quality Assurance Project Plan; and
- Appendix F presents the Cap Repair capital cost estimate.



# CAP REPAIR 100% DESIGN

## INTRODUCTION

This Report provides a detailed discussion of the Cap Repair design, and provides the final construction drawings and specifications required by the SOW. Following approval of this Design, construction of the Cap Repair will commence.

## CAP REPAIR

### General

The goals of the Cap Repair, as outlined in the AOC and SOW, are as follows:

- provide a minimum two-foot thick, low permeability landfill cover over all areas of the landfill; and
- ensure that all areas of the landfill are sloped sufficiently to enhance drainage from the surface of the landfill.

The Predesign Report (Montgomery Watson, May 1997) identified 4 areas on the landfill which do not meet the minimum two-foot thick, low permeability cover requirements. These 4 areas are shown in Figure 4, and for the purposes of design and construction have been identified as Areas 1 through 4, inclusive. As well, visual inspection of the landfill has identified one area on the north side of landfill which has poor surface water drainage. This area is identified as Area 5 (see Figure 4).

The 4 areas of landfill cover will be repaired to meet the thickness and permeability requirements of the AOC and SOW. The areas will be repaired by either placing two feet of low permeability soil material over the identified areas (i.e., Areas 1, 2 and 4), or by excavating a two foot thickness of existing cover material and replacing it with two feet of low permeability soil material (i.e., Area 3). The two foot thickness of excavated material removed from Area 3 will be used as general fill in Area 5, and in Area 4 prior to placement of the new landfill cover.

We have selected placing two-feet of low permeability material over the existing cover in Areas 1, 2 and 4 since these areas currently have good surface water drainage, and

placement of additional soil would not effect these drainage patterns. However, we selected excavation and replacement of existing cover materials in Area 3 since any additional soil placement may cause ponding and would require adjustment to the existing structures and pavement in this area.

Details of the new two-foot thick landfill cap are provided below:

- The edges of the areas requiring repair will be identified, staked, and surveyed. Procedures for determining the edges of the areas are provided later in this report.
- Vegetation will be cleared and grubbed. Trees and shrubs will be chipped for disposal on other parts of the Blackwell Forest Preserve.
- Existing topsoil will be excavated and stockpiled for reuse on top of the cap repair areas.
- In Areas 1 and 2, two feet of low permeability soil material will be placed over the existing unsuitable cover material.
- In Area 3, two feet of existing landfill cover will be excavated and moved to Areas 4 and 5. An existing fence and asphalt pavement would also be removed. However, an existing permanent building in the center of Area 3, which has been constructed on a concrete slab, would not be relocated. The building acts as a barrier to infiltration, and has characteristics meeting the requirements of a suitable cap. Instead, soil would be excavated from around the building. Two feet of new low permeability soil material would then be compacted into the excavation. The fence and asphalt paving will be replaced. The final grades in Area 3 will be the same as the current grades.
- Area 4 will receive some of the excavated soil from Area 3. This soil will be spread in a current low area in the center of Area 4, and will enhance surface water drainage from the final cover. Area 4 contains a manhole and sump which receives surface water drainage from nearby areas of the landfill. This surface water is redirected by an underground pipe to the west side of the landfill. The manhole will be raised to accommodate the additional soil from Area 3, as well as the additional two feet of low permeability soil material in Area 4.
- The new cover materials in Areas 1 through 4 will extend slightly beyond the edge of the landfill refuse, and slightly onto the areas with acceptable landfill cover, as typically shown in Figure 5. The added soil materials will be keyed into the existing landfill cover to provide for a continuous 2-ft thick cap of low-permeability soils.
- The stockpiled topsoil will be replaced and revegetated. The final grades on the repaired landfill cover are shown in Figure 6.

- Existing landfill gas vents and monitoring wells in, or nearby, the areas of cap repair will be protected during construction. Gas vents and other manholes will be raised, as necessary, to match the new grades.

The inadequate surface water drainage in Area 5 will be repaired by placement of additional soil material from Area 3. The existing topsoil will be excavated and temporarily stockpiled for later reuse. Up to 2.5 feet of soil will be placed and sloped to provide a positive grade of approximately 3%, as shown in Figure 6, and the soil will be covered with topsoil and revegetated. The Predesign Investigation has indicated that the existing landfill cover in this area is suitable.

## **CAP REPAIR COMPONENTS**

### **Limits of Cap Continuity Investigation**

Prior to construction, we will undertake an investigation to define the inside edges of Areas 1 through 4 where the existing landfill cover becomes unsuitable. The outside edges of these Areas 1 through 4 (i.e., limits of landfill refuse) have already been defined in the Predesign Investigation Report. The investigation will begin at the approximate edge of the Areas, as defined in the Predesign Investigation Report, at approximately 100 foot intervals. Soil borings, hand augered hole or test pits will be augered or excavated, and the location of adequate existing landfill cover will be documented (i.e., minimum of two feet of suitable material). Additional soil borings, hand augered hole or test pits will be augered or excavated inward or outward, as appropriate, until the edge of suitable landfill cover material has been identified within about 10 feet. The two-foot cap will be extended to these edges in Areas 1 through 4.

All information gathered during the investigation will be documented, and included as part of the final Construction Report.

### **Geotechnical Investigations**

The FPD has obtained some clay borrow material and additional topsoil from an off-site source for use in the cap repairs. The clay borrow and topsoil is currently stockpiled at two locations adjacent to Areas 3 and 5 on the north side of the landfill. The FPD obtained the clay borrow and topsoil from a nearby residential development.

We obtained a sample of material from the clay stockpile in April 1997, and submitted the sample for geotechnical testing under ASTM protocols. The geotechnical testing consisted of Standard Proctor density testing, hydraulic conductivity testing on recompacted soil samples, Atterberg Limits and grain size distribution tests. The geotechnical results are presented in Appendix A and are summarized in Table 1. The results indicate that the clay material is classified as CL under the USCS soil classifications system, and would achieve a permeability of less than  $1 \times 10^{-6}$  cm/sec if compacted at greater than 95% of maximum

Standard Proctor Dry Density and at a moisture content greater than 2% dry of Standard Proctor Optimum Moisture Content. This material is considered suitable for Cap Repair construction when compacted to the above moisture and density requirements.

### **Tie-Ins**

The new clay landfill cover will be keyed into the existing suitable landfill cover at the edges of Areas 1 through 4. Typical tie-in details are shown in Figure 5.

### **Cover Grading**

Grading of the cap repairs will typically conform to the contours shown on the drawings, and shall provide positive drainage. The final surface of the cover will be free from excessive mounds or depressions, and relatively smooth so as not to interfere with seeding, fertilizing, and maintaining the cover. Ancillary requirements for techniques of the grading portion of the landfill cover are specified in Section 02220 of the Construction Specifications - "Excavating, Backfilling and Compacting," included as Appendix B.

### **Vegetative Layer**

A vegetative layer will be established within the topsoil layer following construction. The vegetation will be placed by conventional techniques. Due to the steep slopes in some areas at the landfill, protection of the seeding will be provided using erosion control blanketing and/or mulching. The vegetative layer at the site will consist of a shallow-rooted (to prevent root damage to the cover) blend of grasses. This vegetative blend will protect surface soils from erosion and provide a healthy vegetal cover to promote evapotranspiration. The requirements for seeding are specified in Section 02270 - "Erosion Control (Vegetative)."

### **Excavation of Waste**

Based upon the results of the Predesign Investigation, it appears that landfill refuse will not be encountered during cap repairs. However, if waste must be excavated, it will be handled as outlined in Section 2 of the Expedited Final LCS Design Report.

### **Construction Survey**

Surveying will be performed at the landfill prior to, and following, construction. The location of the 5 repair areas, as well as final elevations and grades, will be documented and summarized in the Construction Report.

### **Restrictive Covenants/Deed Restrictions**

The FPD is currently in the process of executing the restrictive covenants with the DuPage County Recorder that are required by AOC. The FPD will provide notice to the U.S. EPA directly, once such restrictive covenants have been executed and recorded.

### **Site Security**

During construction of the cap repairs, site security measures will be taken to minimize public access to areas of construction or potential contamination without willful disregard of safety by trespassers. Site security will consist of:

- General Warning Signs (e.g., at site entrance, around work areas, on Hazard Barriers);
- Hazard Barriers (e.g., fencing, barricades, excavation coverings);
- Routine inspections of the site security measures; and
- Necessary maintenance.

Any incidents related to site security will be documented and reported to the U.S. EPA.

## **CAP REPAIR CONSTRUCTION**

### **General**

Construction activities will be performed in accordance with the performance standards and specifications outlined in the SOW and with the general industry standards 29 CFR, parts 1910 and 1926. Qualified personnel will be on-site during construction to observe and record the system construction; perform field soil testing; collect representative soil samples for laboratory testing; oversee site safety concerns; and confirm the system is constructed in conformance with the design.

Cap Repair and LCS construction will occur concurrently, and the following activities will be completed in accordance with the SOW:

- Preconstruction Meeting
- PreFinal Inspection
- Final Inspection

### **Construction Specifications**

The construction specifications for the LCS and Cap Repair are presented in Appendix B.

## REPORTS AND SUBMITTALS

This section discusses the reports and submittals for the landfill response actions described in the previous sections of the Design.

### MONTHLY PROGRESS REPORTS

Submittal of Monthly Progress Reports has been previously discussed in the Expedited Final LCS Design Report.

### PERFORMANCE STANDARDS VERIFICATION PLAN

A Performance Standards Verification Plan was previously prepared and submitted with the Expedited Final Design for the LCS. That Plan included:

- A Site Safety Plan, including contingency and air monitoring plans;
- A Construction Quality Assurance Plan, including field sampling plans; and
- Addendum No. 1 to the previously approved Quality Assurance Project Plan.

With modifications and additions, the Performance Standards Verification Plan for the LCS construction is also suitable for the Cap Repair construction. The required modifications and additions include:

- Addendum No. 1 to the Site Safety Plan (SSP);
- Addendum No. 1 to the Construction Quality Assurance Plan (CQAP), including an addendum to the field sampling plans; and
- Addendum No. 2 to the Quality Assurance Project Plan.

These plans are further described in the following subsections.

#### **Addendum No. 1 - Site Safety Plan**

Addendum No. 1 modifies the SSP to indicate that the Plan also applies to cap repair construction (Appendix C). The Addendum also updates Emergency Information.

#### **Addendum No. 1 - Construction Quality Assurance Plan**

Addendum No. 1 amends the CQAP to provide modified or additional quality assurance criteria during construction of cap repairs (Appendix D). Modified quality assurance

activities include changes to the project organization, survey control and soil testing frequency, while additional quality assurance activities include inspection of cap repair construction, clay borrow source testing, and the investigation to determine the extent of suitable landfill cover in selected areas on the landfill.

#### **Addendum No. 2 - Quality Assurance Project Plan**

Addendum No. 2 modifies the QAPP to change selected quality assurance (QA) and quality control (QC) activities to be consistent with a major cap repair effort (Appendix E).

### **DRAFT OPERATION AND MAINTENANCE PLAN**

The Expedited Final LCS Design Report indicated that the Draft O&M Plan would be submitted, as a separate report, after the U.S. EPA's approval of the LCS Design Report and after selection of subcontractors and suppliers. We indicated that this additional time was required to gather information about specific LCS equipment, and that the Final O&M Plan will be prepared during construction of the LCS and will be submitted to the U.S. EPA prior to the PreFinal Construction Inspection for the LCS.

The Draft O&M Plan for the Cap Repair will be combined with the Draft O&M Plan for the LCS. The additional components of the Draft O&M Plan required by the cap repair will include, at a minimum, the following:

- routine inspections for evidence of erosion, uncontrolled landfill gas emissions, stressed vegetation, leachate seeps, and preservation of the landfill cover; and
- mowing and routine erosion repair.

### **CAP REPAIR COST ESTIMATE**

The cost estimate for Cap Repair construction is approximately \$329,000, net present value. Cost estimating details are provided in Appendix F and are based upon approximate item quantities from the Cap Repair 100% Design.

## **COMPLETION OF WORK REPORT**

Within 45 days of a successful final construction inspection, a Completion of Work Report will be submitted to the U.S. EPA to provide a record of the Cap Repair construction. The report will describe construction quality assurance efforts used during construction and will include, at a minimum, the following:

- Description of the construction activities;
- Survey control information;
- Waste spoils disposal (if any);
- Cover restoration activities;
- Record Drawings;
- Photographs that depict construction activities and record conditions; and
- A description of any deviations from the approved plans.



## PROJECT SCHEDULE AND PERSONNEL

### PROJECT SCHEDULE

The Proposed Project Schedule (Figure 2) details when each task of the response actions will occur. The activities associated with the Cap Repair Design, and construction of the LCS and Cap Repair are included in the schedule. The schedule shown in Figure 2 is an expedited schedule that completes the LCS and Cap Repair construction in the 1997 construction season. This schedule is identical to the schedule presented in the Expedited LCS Design Report.

### PROJECT PERSONNEL

The project personnel are indicated on the organization chart presented as Figure 3. The project is led by U.S. EPA Region V Remedial Project Manager, Michael Bellot, phone number (312) 353-6425, and fax (312) 353-5541. He is supported by Mr. Rick Lanham of the Illinois EPA. The Respondent, FPD, is the owner of the DuPage County Landfill / Blackwell Forest Preserve in DuPage County, Illinois. Montgomery Watson, preparer of this submittal, is the Contractor selected to implement the response actions set forth the AOC and SOW.

The following are the key Montgomery Watson personnel for this project and their related qualifications:

- Peter J. Vagt, Ph.D., P.G. - Project Coordinator - Peter has been a project manager and project coordinator for three other CERCLA sites in Region V.
- Walter Buettner, P.E. - Project Manager - Walter has been a project engineer or manager for three other sites in Region V.
- Tom Blair, P.E. - Project Engineer - Tom has been a project engineer for two other sites in Region V, and four other sites in Region VII.
- Project Hydrogeologist - To be determined.

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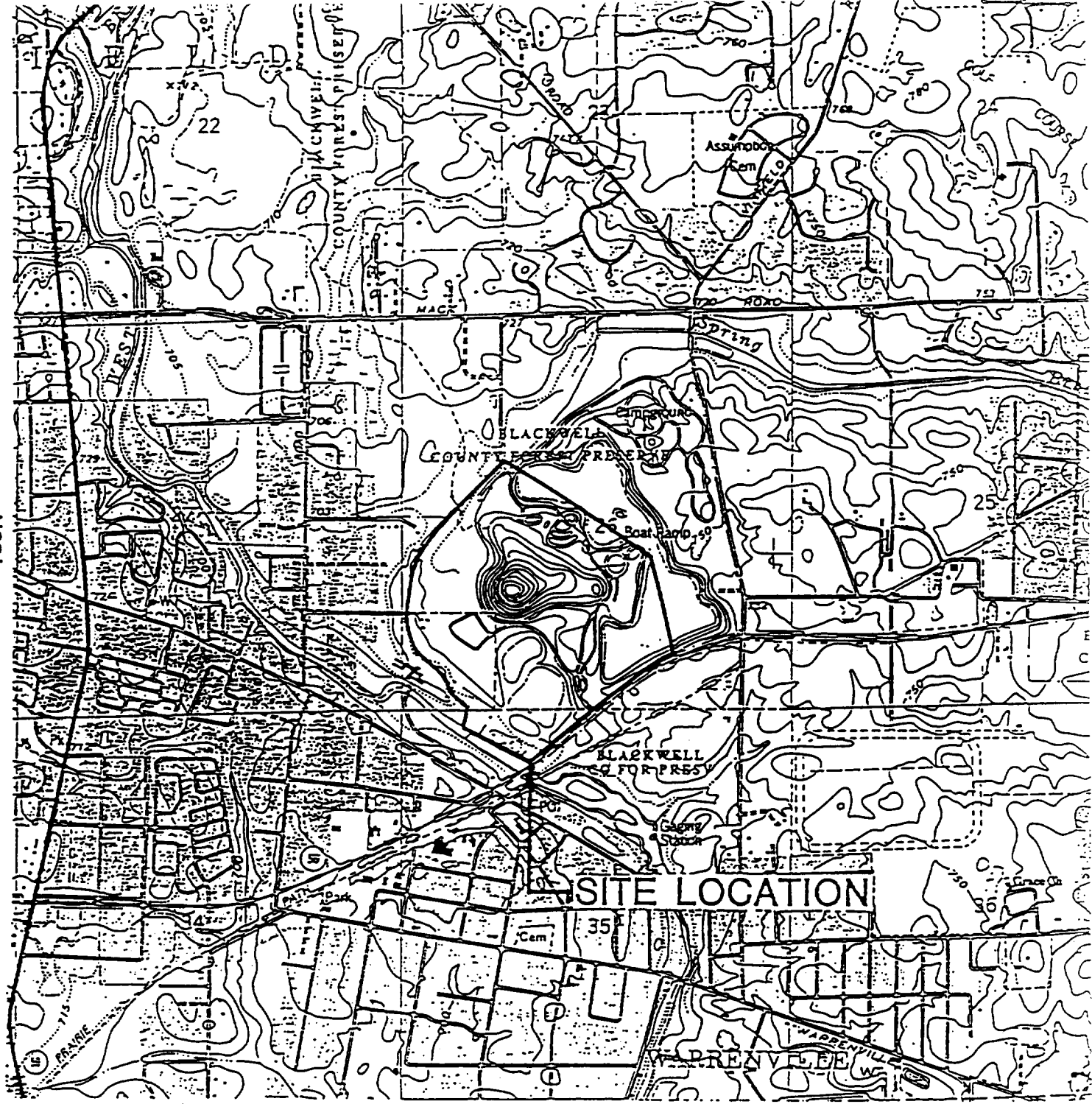


**Table 1 Summary of Geotechnical Testing**

<b>Parameters</b>	<b>Clay Stockpile</b>
Grain Size Analysis (ASTM D422)	
% Sand & Gravel	7
% Silt & Clay	93
Natural Moisture Content	
Percent of Moisture Range	14.7- 20.7
Average Percent of Moisture	17.3
Atterburg Limits (ASTM D4318)	
Liquid Limit	47%
Plastic Limit	15%
Plasticity Index	32%
Triaxial Permeability Test (ASTM D5084)	
@ 95% of Max. Dry Density (cm/s)	
@ 2% dry of Optimum Water Content	$2.7 \times 10^{-7}$
@ Optimum Water Content	$5.3 \times 10^{-8}$
@ 2% wet of Optimum Water Content	$1.1 \times 10^{-7}$
Standard Proctor (ASTM D698)	
Maximum Dry Density	105.7 pcf
Optimum Moisture Content	18.7%
USCS Classification	CL

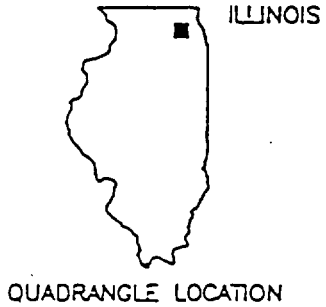


in approval of Montgomery Watson, ( ) Land Professional DUE 4-1-96 ( ) Project Manager Other

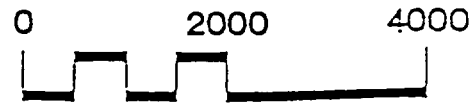


**NOTE**

BASE MAP DEVELOPED FROM THE NAPERVILLE, ILLINOIS, 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP, DATED 1993.

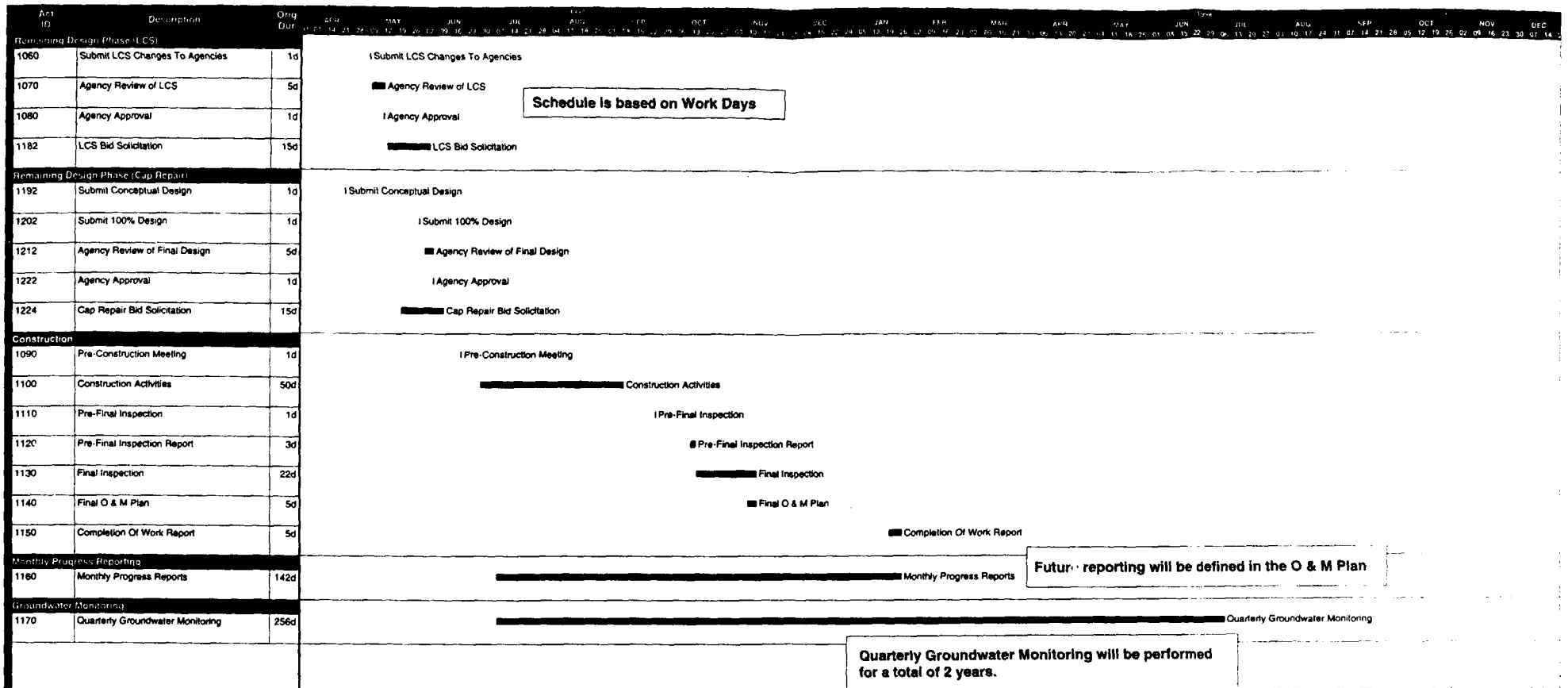


QUADRANGLE LOCATION



SCALE IN FEET FIGURE 1

Developed By DRF	Drawn By DLF	SITE LOCATION MAP  RESPONSE ACTIONS BLACKWELL LANDFILL SITE DU PAGE COUNTY, ILLINOIS	Drawing Number 3920.0014
Approved By T. Kersch	Date 4-19-96		A2
Reference			MONTGOMERY WATSON
Revisions			



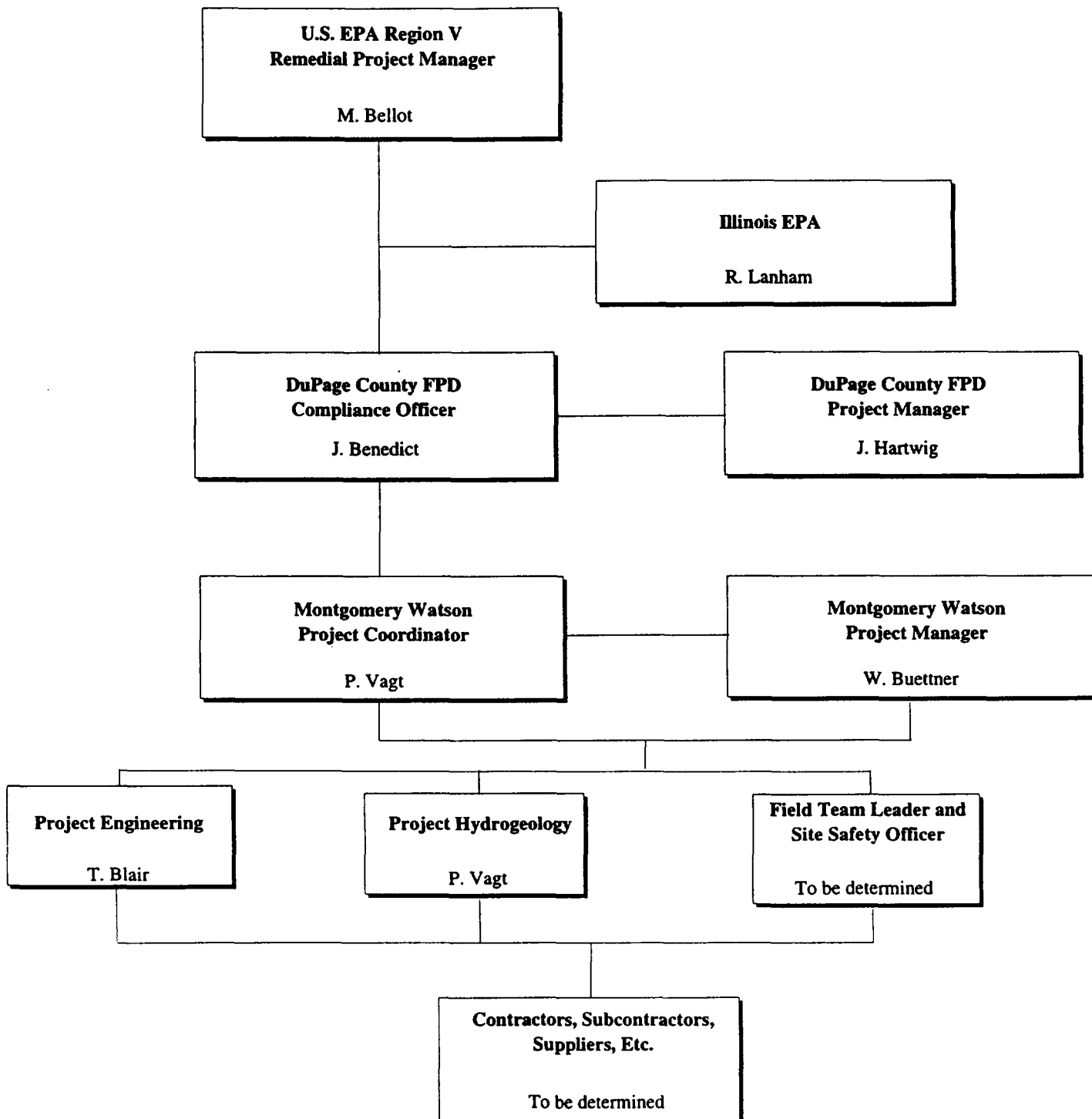
Company name: Montgomery Watson  
 Run date: 27MAY97  
 Start date: 01APR97  
 Finish date: 08JUL98  
 © Primavera Systems, Inc.

Figure 2  
 Expedited Project Schedule  
 Blackwell Landfill Site  
 DuPage County, Illinois  
 Montgomery Watson

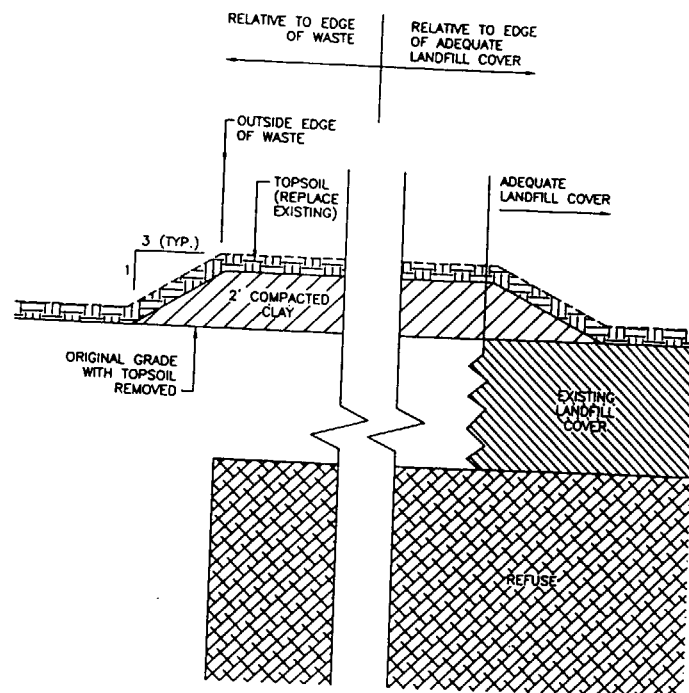
■ Early bar  
 ■ Progress bar  
 ■ Critical bar  
 — Summary bar  
 ▲ Progress point  
 ▲ Critical point  
 □ Summary point  
 ◆ Start milestone point  
 ◆ Finish milestone point

# ORGANIZATION CHART

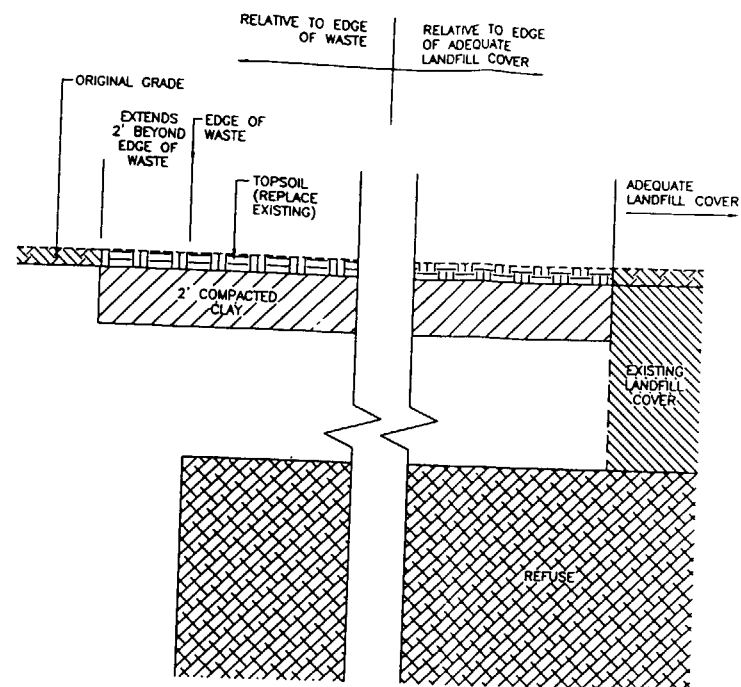
## BLACKWELL LANDFILL RESPONSE ACTION-LCS



**FIGURE 3**



TYPICAL CAP ANCHOR FOR  
AREAS 1, 2, AND 4.  
NEW CAP PLACED  
ABOVE GRADE.



TYPICAL CAP ANCHOR FOR  
AREA 3.  
NEW CAP PLACED  
TO ORIGINAL GRADE.



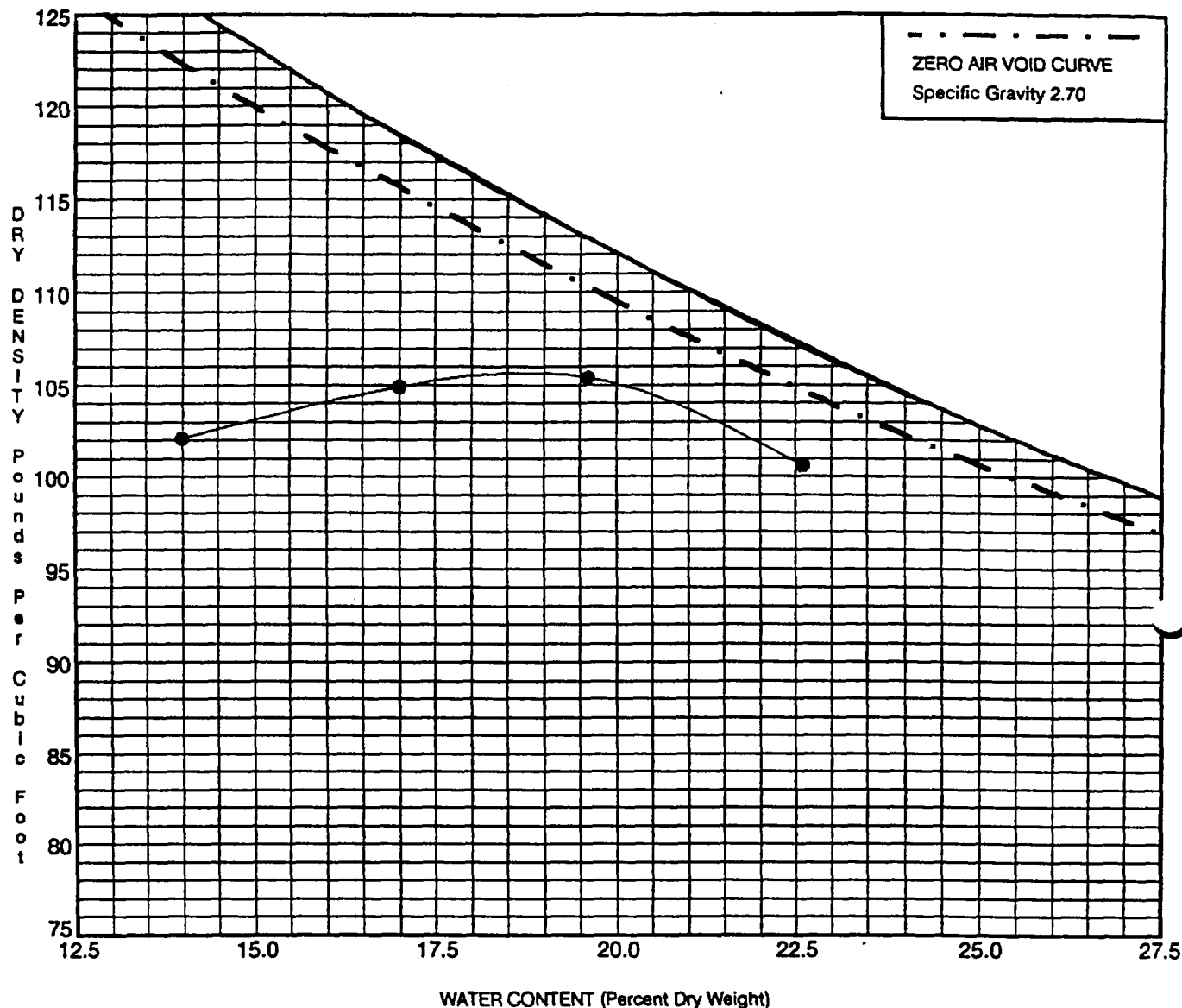


A



**A**

**GEOTECHNICAL TESTING**



<b>SPECIMEN IDENTIFICATION</b>	<b>CLASSIFICATION</b>
West Stockpile	Brown and gray silty CLAY, trace sand and organic (CL)
<b>MOISTURE/DENSITY RELATIONSHIP</b>	<b>NOTES :</b>
<input checked="" type="checkbox"/> Standard ASTM D698/AASHTO T99	
<input type="checkbox"/> Modified ASTM D1557/AASHTO T180	
Maximum Dry Density (PCF) <b>105.7</b>	
Optimum Water Content (%) <b>18.7</b>	

PROJECT <u>Blackwell Forest Preserve</u>	JOB NO. <u>L 40,821</u>	
LOCATION <u>DuPage County, Illinois</u>	DATE <u>May 23, 1997</u>	

### MOISTURE-DENSITY RELATIONSHIP

Testing Service Corporation  
CAROL STREAM

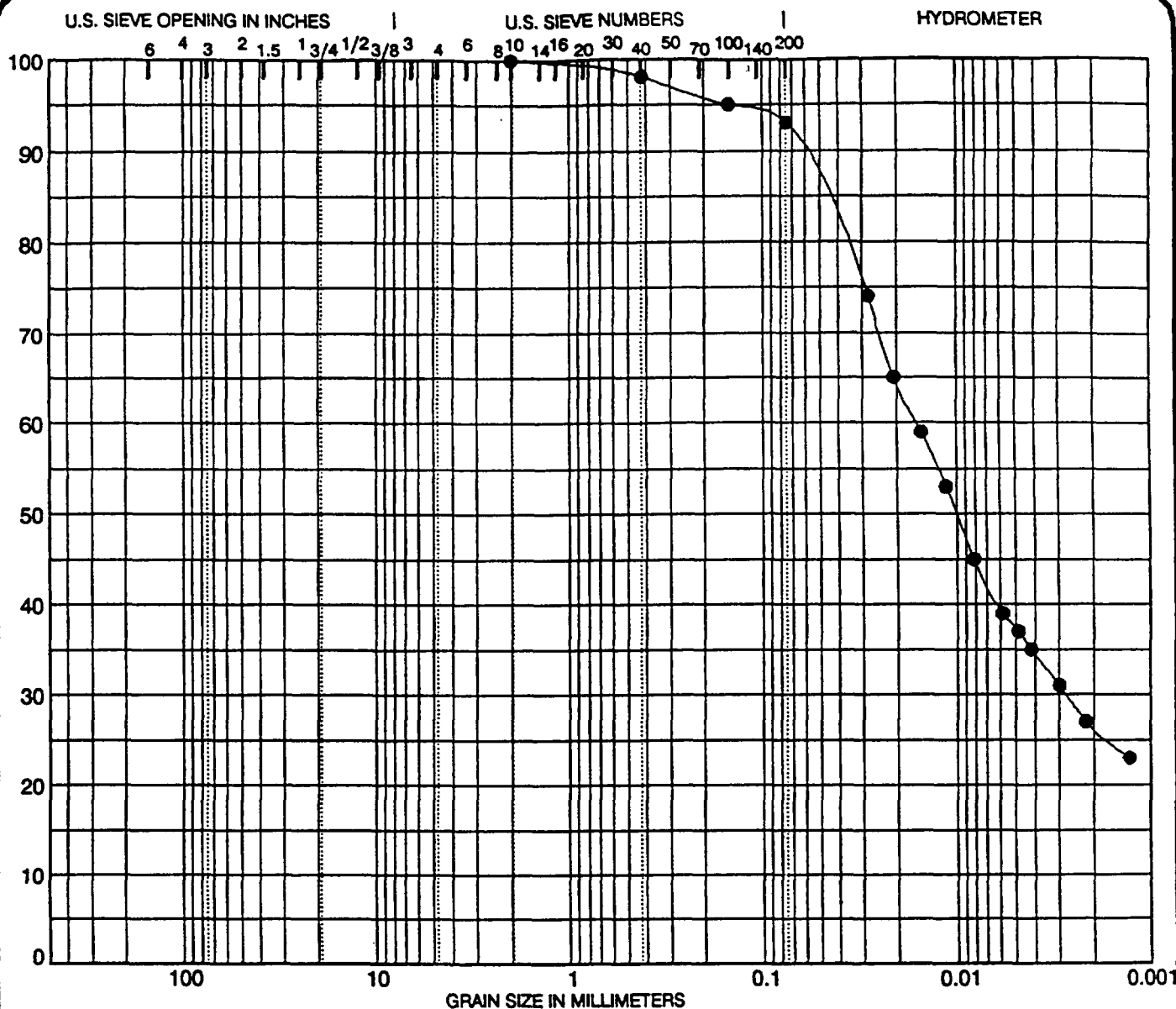


SPECIMEN IDENTIFICATION		SIEVE	% PASS	CLASSIFICATION				
West Stockpile		3 inch	100	Brown and gray silty CLAY, trace sand and				
		2	100	organic (CL)				
2% wet of Optimum Moisture		1 1/2	100					
		1	100	%GRAVEL	%SAND	%SILT	%CLAY	
PERMEABILITY		3/4	100	0	7	67	26	
GRADIENT	27.8	3/8	100					
EFFECTIVE STRESS (psi)	3.0	# 4	100	$\gamma_{dry}^{(pcf)}$	%MC	LL	PL	PI
CELL PRESSURE (psi)	42.0	# 10	100	100.6	22.6	47	15	32
K (cm/sec)	1.1X10-07	# 40	98					
		# 100	95	Density/Moisture Relationship: Mod				
		# 200	93	Max PCF	105.70	Opt WC%	18.7	

JOB NO. L 40,821  
DATE May 23, 1997

**Testing Service Corporation**  
**CAROL STREAM**





TESTING SERVICE CORPORATION  
TEST DATA SHEET  
TRIAxIAL PERMEABILITY TEST

JOB NO. : 40821  
LOCATION : West Stockpile  
DEPTH : 70167  
SAMPLE :  Point  
          wt

DATE : 4-29-97

SAMPLE DIMENSIONS

HEIGHT (l) 7.60 cm.  
DIAMETER: 7.30 cm  
AREA (A): 41.85 cm.<sup>2</sup>  
VOLUME : 318.09 cm.<sup>3</sup>  
PIPETTE -AREA (a): 0.785 cm.

TEST PRESSURES

CELL : 42.0 p.s.i  
INFLOW : 40.5 p.s.i  
BACK : 37.5 p.s.i  
GRADIENT : 27.8  
EFF. STRES 3.0 p.s.i.

-----TEST DATA-----

ELAPSED TIME MINUTES (t)	INFLOW READING	OUTFLOW READING (X)	(X-Y)	HEAD EQUIVALENT (h)	ln	K (CM/SEC)
	3.40	20.30	16.90	227.86	5.42873	
60.0	4.10	19.50	15.40	226.36	5.42213	1.31E-07
215.0	6.60	17.00	10.40	221.36	5.39979	1.23E-07
35.0	7.00	16.60	9.60	220.56	5.39617	1.23E-07
85.0	7.90	15.70	7.80	218.76	5.38798	1.15E-07
815.0	15.40	8.10	-7.30	203.66	5.31645	1.04E-07
90.0	16.10	7.30	-8.80	202.16	5.30906	9.76E-08
150.0	17.20	6.30	-10.90	200.06	5.29862	8.27E-08
85.0	17.80	5.70	-12.10	198.86	5.29260	8.41E-08

HEAD EQUIVALENT :  
[(INFLOW P.-OUTFLOW P.)\*70.32]  
211.0

$$K = [(a \cdot l) / (2A \cdot t)] \cdot \ln(h_1/h_2)$$

K avg = 1.1E-07 cm/sec



TESTING SERVICE CORPORATION  
TEST DATA SHEET  
TRIAxIAL PERMEABILITY TEST

JOB NO. : 40821  
LOCATION : West Opt.  
DEPTH :  
SAMPLE :

DATE : 5-1-97

SAMPLE DIMENSIONS

HEIGHT (l) 7.53 cm.  
DIAMETER: 7.24 cm  
AREA (A): 41.17 cm.<sup>2</sup>  
VOLUME : 310.00 cm.<sup>3</sup>  
PIPETTE -AREA (a): 0.785 cm.

TEST PRESSURES

CELL : 46.0 p.s.i.  
INFLOW : 44.5 p.s.i.  
BACK : 41.5 p.s.i.  
GRADIENT : 28.0  
EFF. STRES 3.0 p.s.i.

TEST DATA

ELAPSED TIME MINUTES (t)	INFLOW READING	OUTFLOW READING (X)	(X-Y)	HEAD EQUIVALENT (h)	ln	K (CM/SEC)
	0.20	24.00	23.80	234.76	5.45856	
80.0	0.70	23.30	22.60	233.56	5.45344	7.66E-08
115.0	1.30	22.50	21.20	232.16	5.44743	6.26E-08
120.0	1.90	21.90	20.00	230.96	5.44224	5.17E-08
150.0	2.60	21.10	18.50	229.46	5.43573	5.20E-08
955.0	6.90	16.60	9.70	220.66	5.39662	4.90E-08
80.0	7.20	16.30	9.10	220.06	5.39390	4.07E-08
90.0	7.50	15.90	8.40	219.36	5.39071	4.24E-08
160.0	8.20	15.20	7.00	217.96	5.38431	4.79E-08

HEAD EQUIVALENT :  
[(INFLOW P.-OUTFLOW P.)\*70.32]  
211.0

$$K = [(a \cdot l) / (2A \cdot t)] \cdot \ln(h_1/h_2)$$

K avg = 5.3E-08 cm/sec

TESTING SERVICE CORPORATION  
TEST DATA SHEET  
TRIAxIAL PERMEABILITY TEST

JOB NO. : 40821  
LOCATION : West  
DEPTH : Dry point  
SAMPLE :

DATE : 5-1-97

SAMPLE DIMENSIONS

HEIGHT (l) 8.30 cm.  
DIAMETER: 7.27 cm  
AREA (A): 41.51 cm.<sup>2</sup>  
VOLUME : 344.54 cm.<sup>3</sup>  
PIPETTE -AREA (a): 0.785 cm.

TEST PRESSURES

CELL : 37.5 p.s.i  
INFLOW : 36.0 p.s.i  
BACK : 33.0 p.s.i  
GRADIENT : 25.4  
EFF. STRES 3.0 p.s.i.

TEST DATA

ELAPSED TIME MINUTES (t)	INFLOW READING	OUTFLOW READING (X)	(X-Y)	HEAD EQUIVALENT (h)	ln	K (CM/SEC)
	1.40	23.00	21.60	232.56	5.44915	
20.0	1.80	22.50	20.70	231.66	5.44527	2.54E-07
25.0	2.50	21.70	19.20	230.16	5.43877	3.40E-07
35.0	3.20	20.90	17.70	228.66	5.43224	2.44E-07
45.0	4.50	19.60	15.10	226.06	5.42080	3.32E-07
55.0	5.50	18.40	12.90	223.86	5.41102	2.33E-07
40.0	6.30	17.50	11.20	222.16	5.40340	2.49E-07
45.0	7.20	16.60	9.40	220.36	5.39526	2.36E-07
90.0	9.00	14.70	5.70	216.66	5.37833	2.46E-07

HEAD EQUIVALENT :  
[(INFLOW P.-OUTFLOW P.)\*70.32]  
211.0

$$K = [(a \cdot l) / (2A \cdot t)] \cdot \ln(h_1/h_2)$$

$$K \text{ avg} = 2.7E-07 \text{ cm/sec}$$

TESTING SERVICE CORPORATION  
457 EAST GUNDERSEN DRIVE  
CAROL STREAM, ILLINOIS

GRAIN SIZE ANALYSIS  
FOR

TSC JOB # 40821  
SOIL BORING # 70167  
SAMPLE # WEST

SAMPLE DESCRIPTION  
DATE OF TEST 3-12-97

HYDROMETER DATA REDUCTION

ELAPSED TIME	TEMP. C	HYDROMETER READING	CORRECTED READING	LENGTH OF HYDROMETER	DI (MM)	% FIN
0.00	22	0		0.0		D=K(L/T) ^
0.50	22	47.0	41.7	8.6	0.0544	82.3
1.00	22	45.0	39.7	8.9	0.0391	78.4
2.00	22	43.0	37.7	9.2	0.0281	74.4
4.00	22	38.0	32.7	10.1	0.0208	64.6
8.00	22	35.0	29.7	10.6	0.0151	58.6
15.00	22	32.0	26.7	11.1	0.0113	52.7
30.00	22	28.0	22.7	11.7	0.0082	44.8
60.00	22	25.0	19.7	12.2	0.0059	38.9
90.00	22	24.0	18.7	12.4	0.0049	36.9
120.00	22	23.0	17.7	12.5	0.0042	35.0
240.00	22	21.0	15.7	12.9	0.0030	31.0
480.00	22	19.0	13.7	13.2	0.0022	27.1
1440.00	22	17.0	11.7	13.5	0.0013	23.1

Total Wt 301.2

HYDRO.SAMPLE WT. 50

SIEVE SIZE	% PASSING		
3 INCH	0.0	100.0	% SAND & GRAVEL 7
2 INCH	0.0	100.0	% SILT & CLAY 93
1-1/2 INCH	0.0	100.0	
1 INCH	0.0	100.0	
3/4 INCH	0.0	100.0	0.002 mm CLAY DIVISION
3/8 INCH	0.0	100.0	% SILT 66
#4	0.0	100.0	% CLAY 27
#10	0.8	99.7	
#40	0.9	97.9	0.005 mm CLAY DIVISION
#100	1.5	94.9	% SILT 56
#200	0.8	93.4	% CLAY 37



TESTING SERVICE CORPORATION  
457 East Gundersen Drive  
Carol Stream, Illinois 60188

## SOIL TEST DATA

CLIENT: Montgomery Watson Americas, Inc.  
2100 Corporate Drive, Addison, IL

JOB NUMBER: 40,821

PROJECT: Blackwell Forest Preserve  
DuPage County, IL

DATE: June 2, 1997

LOCATION	West Stock Pile				
SAMPLE NUMBER	No. 1	No. 2	No. 3		
DEPTH IN FEET					
GRADATION - PASSING 1" SIEVE	%				
" 3/4" "	%				
" 1/2" "	%				
" No. 4 "	%				
" No. 10 "	%				
" No. 40 "	%				
" No. 100 "	%				
" No. 200 "	%				
SAND	%				
SILT	%				
CLAY	%				
LIQUID LIMIT	%				
PLASTICITY INDEX	%				
UNIFIED CLASSIFICATION					
PERMEABILITY	cm/sec				
DRY UNIT WEIGHT	pcf				
C. E. C. ME/100 gms of soil % clay					
IN-SITU WATER CONTENT	%	14.7	20.7	18.4	

B



**B**

**LCS AND CAP REPAIR CONSTRUCTION SPECIFICATIONS**

## **SECTION 01010 SUMMARY OF WORK**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Work covered by contract documents
- B. Work performed by others
- C. Work sequence

#### **1.02 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The work covered by this document includes, but is not limited to:
  - 1. Provide mobilization, demobilization, Contractor site safety plan and implementation, clearing and grubbing, and silt fencing to properly perform the leachate collection system installation and cap repair construction.
  - 2. Provide and maintain survey control, including staking and temporary benchmarks during construction.
  - 3. Install gas header pipe, compressed air supply line, leachate gravity conveyance pipe, leachate pressure conveyance pipe, control wires, and with associated cleanouts, driplegs, and risers.
  - 4. Install gas vents.
  - 5. Install lift station including pump and controls.
  - 6. Install buried leachate holding tank with floats, controls, and loadout facility.
  - 7. Install leachate extraction well pumps, controls, and wellheads.
  - 8. Install compressor station with building and foundation, compressor, filters, dryers, and control system.
  - 9. Provide gravity connections of leachate collection system to two existing liquids cutoff trench manholes.
  - 10. Provide electrical system supply with connections and controls.

11. Provide chainlink fencing with gates.
  12. Provide crushed aggregate paving.
  13. Remove and stockpile top soil prior to cap repair construction, replace topsoil when construction is complete.
  14. Construct cap repair in designated areas using owner-supplied on-site soils, including excavation where necessary, transport, placement and compaction of soils. The cap repair will be conducted as follows:
    - Areas 1 and 2 will be cleared of vegetation, and stripped of topsoil. Two feet of clay soils will be placed, compacted and graded to match design grades. Topsoil will be replaced, regraded and vegetated, all in accordance with the technical specifications.
    - Area 3 will be stripped of topsoil and asphalt paving, as necessary, and the existing fence is to be removed. The existing building shall not be disturbed. The area will be excavated to a depth of two feet. This material will be used as fill in Areas 4 and 5 during cap construction. Two feet of clay soils will be placed, compacted and graded to match design grades. Topsoil will be replaced, regraded and vegetated, all in accordance with the technical specifications. The fence and asphalt paving are to be replaced.
    - Area 4 will be cleared of vegetation and stripped of topsoil. Some of the excavated soils from Area 3 will be placed and used as fill below the clay cap soil in Area 4. Two feet of clay soils will be placed, compacted and graded to match design grades. Topsoil will be replaced, regraded, and vegetated, all in accordance with the technical specifications.
    - Area 5 will regraded, using excavated soils from Area 3, as indicated on the Drawings to improve site drainage.
  15. Maintain existing manholes, vents and monitoring wells. Where necessary, as directed by the Engineer, raise gas vents and manholes to match final grades.
  16. Provide surface restoration of disturbed areas and seed, fertilize, and mulch.
- B. The Blackwell Forest Preserve Landfill site will be open to the public throughout construction of the leachate collection system. Extreme caution must be used when entering, working at, and leaving the site.



- C. Leachate collection system and cap repair construction is one of the many activities that will take place at the Blackwell Forest Preserve Landfill site during the response action process. The site is a Superfund site and all work must be performed in conformance with the Administrative Order by Consent between the U.S. EPA and the Respondent, Forest Preserve District of DuPage County, Illinois (U.S. EPA Docket No. V-W-96-C-341, March 7, 1996) and all related documents.
- D. Storage of materials and equipment will occur at an area designated by the Forest Preserve District for staging of construction materials and facilities.
- E. The site is not completely secured by a fence or other manner. The Contractor shall be responsible for protecting his material and equipment from vandalism or damage.
- F. During construction of the cap repair and LCS, site security measures shall be taken by the Contractor to prevent public access to areas of construction or potential contamination, without willful disregard of safety by trespassers. Site security shall consist of:
- General Warning Signs (e.g., around work area, on Hazard Barriers)
  - Hazard Barriers (e.g., fencing, barricades, excavation coverings)
  - Routine inspections of the site security measures
  - Necessary maintenance.

Any incidents related to site security will be documented and reported to the Engineer for reporting to the Owner and U.S. EPA. The Owner will be responsible for site entrance warning signs and coordination with the park officials for general notification.

### 1.03 WORK PERFORMED BY OTHERS

- A. The Forest Preserve District of DuPage County and Montgomery Watson reserve the right to approve all subcontractors and suppliers for this project. If the Owner has a reasons to believe that any of the subcontractors and suppliers do not meet the qualifications of the Specifications, the Owner or Engineer may request a change.
- B. Capping soils, needed for cap repair and cover restoration, shall be supplied by the owner. The soils are stockpiled on-site near cap repair Area 4. Contractor must supply unit price for soil excavation, transport, placement and compaction. Quantities will be as determined by Engineer and agreed to by Contractor.
- C. Initial layout of the layout of the leachate collection system and cap repair areas, and initial survey will be performed by the Engineer. Interim surveying of

leachate collection system layout and cap repair areas will be performed by Contractor. Contractor is responsible for maintaining staking or creating offsets as necessary to construct LCS and cap repair. Final as-built survey will be performed by the Engineer. Documentation of all materials, grades, construction methods and design changes is the responsibility of the Contractor, subject to verification by the Owner and/or Engineer.

D. Excavation of landfill waste is not anticipated.

#### 1.04 WORK SEQUENCE

- A. Due to the use of the Blackwell Forest Preserve for public recreation and the amount of work to be performed, maintaining an expedited schedule for this project is critical. Prior to commencing work, the Contractor shall submit a detailed construction schedule to the Owner and the Engineer for approval.
- B. Contractor shall regulate operations, work shifts, and work force to maintain the schedule for timely completion of the project. The Owner must approve all work shifts or requests prior to working.

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**SECTION 01016**  
**HEALTH AND SAFETY CONSIDERATIONS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Implementing project Site Safety Plan.

**1.02 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Basis of Measurement: Site Safety Plan by lump sum.
- B. Basis of Payment: Includes preparing and implementing a Contractor's project Site Safety Plan.

**PART 2 - PRODUCTS**

Not Used

**PART 3 - EXECUTION**

**3.01 CONSTRUCTION**

- A. The Contractor's Site Safety Plan must be in substantial conformance with the Engineer's Site Safety Plan.
- B. Contractor shall be solely and completely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Take all necessary precautions for the safety of, and provide the necessary protection to prevent injury or loss to all Contractor's employees and Contractor's Subcontractors.
- C. Comply with all applicable OSHA regulations. The Contractor's Site Safety Plan does not supersede or in any way relieve the Contractor of obligations under any applicable OSHA regulations including 29 CFR 1910: Occupational Safety and Health Standards and 29 CFR 1926: Health and Safety Regulations for Construction.
- D. Become familiar with potential hazardous health and safety conditions and risks associated with working in or near decomposing refuse at a landfill site and take the applicable precautions for work at the project site.

- E. Contractor shall be solely responsible for determining and providing an appropriate site safety program, including monitoring, equipment, plans in event of problems and/or emergencies, and other related items as needed.
- F. Submit, for informational purposes only, a Site Safety Plan to the Engineer and Owner a minimum of two (2) weeks prior to the start of any field activities.

### 3.02 RESTRICTION OF SMOKING

- A. Do not smoke, at a minimum, within 100 ft of the work area.

### 3.03 SITE SAFETY PROGRAM

- A. Develop and implement a Site Safety Program in accordance with all applicable OSHA regulations, 29 CFR 1910 and 29 CFR 260, and any other applicable federal, state, or local agency regulations or requirements. At a minimum, the Contractor's Site Safety Plan shall include, but not be limited to the items required by OSHA 29 CFR 1910.120:
  - 1. Organizational structure.
  - 2. Comprehensive work plan.
  - 3. Hazard analysis for each site task.
  - 4. Employee training.
  - 5. Personal protective equipment to be used for each task.
  - 6. Medical surveillance.
  - 7. Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used.
  - 8. Site control measures.
  - 9. Decontamination procedures.
  - 10. Emergency response plan.
  - 11. Confined space entry procedures (if part of scope of work).
  - 12. Spill containment program.

B. Provide to the Engineer, prior to the start of any field activities, certification that requirements of this Section have been met. This certification shall include:

1. Documentation of the training required under OSHA 29 CFR 1910.120 for site personnel and supervisors.
2. Documentation of current first aid and CPR training for at least two employees per work shift.
3. Documentation of participation of all site personnel in a medical surveillance program in accordance with OSHA 29 CFR 1910.120.
4. Documentation that all site personnel expected to wear respiratory protection have been medically examined and approved for wearing such equipment and have been fit tested in accordance with OSHA regulations.

C. If the Owner or Engineer observes any of the Contractor's employees or Subcontractors engaging in an unsafe act or procedure that may result in serious injury or death to the person performing the act/procedure, or to any other person, the Owner or Engineer shall have the right, but not the duty, to stop the work until the condition is corrected.

The Contractor shall be held responsible for any increased costs that result from this work stoppage.

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**SECTION 01041**  
**COORDINATION AND MEETINGS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Coordination
- B. Field Engineering
- C. Preconstruction Meeting
- D. Progress Meetings

**1.02 COORDINATION**

- A. Coordinate scheduling, submittals, and Work of the various Sections of the Specifications to assure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify that utility requirements and operating equipment characteristics are compatible. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.
- C. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion.
- D. Coordinate work with all Subcontractors and Suppliers.

**1.03 PRE-CONSTRUCTION MEETING**

- A. Owner and Engineer will schedule a meeting once U.S. EPA approval of the design is granted.
- B. Attendance Required: Owner, Engineer/Construction Manager, and Contractor.

C. The following agenda will be addressed. Some items may be addressed prior to the pre-construction meeting based on Owner/Engineer/Contractor negotiations:

1. Execution of Owner-Contractor Agreement.
2. Submission of insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of Subcontractors, list of products, Schedule of Values, and construction schedule.
5. Designation of personnel representing the Owner, Contractor, and Engineer/Construction Manager.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and contract closeout procedures.
7. Review Site Safety Plans.
8. Scheduling.

#### 1.04 PROGRESS MEETINGS

- A. Engineer shall schedule and administer meetings throughout progress of the Work at maximum weekly intervals.
- B. Attendance Required: Contractor, major Subcontractors and Suppliers, Owner, Engineer/Construction Manager, as appropriate to set up agenda topics for each meeting.
- C. Proposed Agenda:

1. Review minutes of previous meetings.
2. Review of work progress.
3. Field observations, problems, and decisions.
4. Identification of problems that impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Planned progress during succeeding work period.
10. Maintenance of quality and work standards.
11. Effect of proposed changes on progress schedule and coordination.

12. Other business relating to Work.

1.05 PRE-FINAL INSPECTION

- A. Engineer shall schedule the Pre-Final Inspection meeting after construction is substantially complete and attendance is required by Contractor, major Subcontractors and Suppliers (as appropriate), Engineer, Owner, and the U.S. EPA.

1.06 FINAL INSPECTION

- A. Items identified as not completed during the Pre-Final Inspection shall be completed prior to the Final Inspection. Engineer should schedule the Final Inspection after all construction/installation items are complete and attendance is required by Contractor, Engineer, Owner, and the U.S. EPA.

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## **SECTION 01051 GRADES, LINES, AND LEVELS**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Vertical and horizontal control for construction
- B. Layout of areas of work
- C. Location of existing utilities

#### **1.02 QUALITY ASSURANCE**

- A. All survey work for initial layout and final documentation shall be under the direction of the Owner's selected licensed surveyor. Contractor shall have a surveyor for all other grade stakes and control during construction.

### **PART 2 - PRODUCTS**

#### **2.01 VERTICAL CONTROL**

- A. Vertical control shall be temporarily established by the Contractor around the site at locations to be approved by the Engineer. Existing permanent benchmarks and information will be provided by Owner.
- B. Contractor shall promptly inform Engineer when a temporary or permanent benchmark has been lost, destroyed, or damaged. Contractor will be responsible for maintaining temporary benchmarks, establishing and re-establishing grade stakes, and replacing permanent benchmarks if damaged by Contractor's activities.

#### **2.02 AREAS OF WORK**

- A. Areas of work shall be clearly marked by flagged 4-ft high wooden stakes. A brief description of the spot that the stake is marking shall be written on the post.

#### **2.03 EXISTING UTILITIES**

- A. Owner shall call the local utilities or J.U.L.I.E. at 1-800-892-0123 (Diggers Hotline service), a minimum of two weeks before starting construction to mark utilities. [The Montgomery Watson J.U.L.I.E. identification number is 9110675.]

- B. The location of the existing utilities shall be clearly marked at a minimum 100-ft intervals with flags, stakes, and paint on the ground surface, as appropriate.

### PART 3 - EXECUTION

#### 3.01 SURVEYING

- A. Owner shall perform initial staking of the following items:

1. Compressor station and buried tank locations
2. Gas and leachate header pipe trench locations
3. Dripleg locations
4. Lift station location
5. Extent of cap repair

- B. Contractor will establish temporary benchmarks near the construction locations. Protection of these benchmarks shall be the responsibility of the Contractor. If re-establishment of vertical or horizontal control is required, this shall be conducted by the Contractor at no cost to the Owner.

- C. Contractor shall retain a licensed surveyor to establish and maintain interim grade stakes required for construction of LCS and cap repair.

- D. Engineer shall verify documentation of construction of the following items with surveys:

1. Pipe inverts and locations of gas and leachate header pipe trenches.
2. Locations and inverts of driplegs, lift station, and buried leachate tank.
3. Pipe inverts and locations of the two liquids cutoff trench manhole connections.
4. Initial and final Cap Repair grade elevations.

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**SECTION 01060  
REGULATORY REQUIREMENTS**

**PART 1 - GENERAL**

**1.01 NOTIFICATIONS**

- A. Give all notices; observe and comply with all laws, rules, regulations, and ordinances applicable to the Work.
- B. Owner shall notify area utility companies before beginning Work, in accordance with state and local regulations.

**1.02 PERMITS**

- A. Obtain and pay for all construction permits and licenses and pay all governmental charges necessary for the prosecution of the Work.

**1.03 TAXES**

- A. Pay all sales, consumer use, and other similar taxes required to be paid in accordance with the laws applicable to the Project site.

**1.04 CONSTRUCTION REQUIREMENTS**

- A. Construct in accordance with the requirements of the Administrative Order by Consent between the U.S. EPA and the Respondent, Forest Preserve District of DuPage County, Illinois, and all applicable state and federal regulations.

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## **SECTION 01300 SUBMITTALS**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Progress Reports and Summary Reports
- B. Construction Observation Report
- C. Product Data

### **PART 2 - PRODUCTS**

- A. Not Used

### **PART 3 - EXECUTION**

#### **3.01 PROGRESS REPORTS AND SUMMARY REPORTS**

- A. Contractor shall submit weekly progress reports and monthly summary reports to the Engineer.
- B. Monthly summary reports shall contain quantities for payment as described in the technical specifications.
- C. Quantities for payment shall have been agreed upon in writing by both Contractor and Engineer.

#### **3.02 CONSTRUCTION OBSERVATION REPORT**

- A. Upon completion of the project, the Engineer shall submit a construction observation report to the Owner. Report shall cover work required to complete this project.

### 3.03 PRODUCT DATA

- A. Contractor shall mark each submittal copy(ies) to identify applicable products, models, options, and other data; and supplement manufacturer's standard data to provide information unique to the Work.
- B. Submit copies of data to Engineer.

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## **SECTION 01400 QUALITY CONTROL**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Quality Assurance and Control of Installation
- B. Field Samples
- C. Laboratory Services
- D. Manufacturer's Field Service and Reports

#### **1.02 QUALITY ASSURANCE/CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to provide work of specified quality.
- B. Comply fully with manufacturing instructions, including each step in sequence.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Work shall be performed by persons qualified to perform workmanship of specified quality.
- F. Work shall conform to Specifications and Construction Quality Assurance Plan (CQAP) for the Cap Repair and LCS.

#### **1.03 FIELD SAMPLES**

- A. Sampling shall occur at the frequency and by the party identified in individual specification sections. Sampling will be performed according to American Standard Testing Materials (ASTM) and Geosynthetic Research Institute (GRI) procedures.

#### 1.04 LABORATORY SERVICES

- A. Engineer shall employ and pay for services of a laboratory to perform required laboratory testing.
- B. Retesting required because of non-conformance with specified requirements shall be performed on instruction of the Engineer. Payment for retesting will be paid by the Contractor.

#### 1.05 MANUFACTURER'S FIELD SERVICE AND REPORTS

- A. Submit qualifications of manufacturer's representative to Engineer 14 days in advance of required testing.
- B. When specified in individual specification sections, the Contractor shall require material or product suppliers, or manufacturers, to provide qualified staff personnel to observe site conditions; conditions of surfaces and installation; quality of workmanship; start-up of equipment; and testing, adjustment, and balance of equipment as applicable and to include instructions where necessary.
- C. The manufacturer's representative shall report observations and site decisions or instructions given to applications or installers that are supplemental or contrary to manufacturer's written instructions to the Engineer.
- D. Submit reports (weekly progress and monthly summary) in duplicate to Engineer within 30 days of observation.

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**SECTION 01500**  
**CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary Utilities: Electricity, telephone service, water, and sanitary facilities
- B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control
- C. Construction Facilities: Construction trailer, access roads, parking, progress cleaning

**1.02 RELATED SECTIONS**

- A. Section 01010 - Summary of Work

**1.03 TEMPORARY ELECTRICITY**

- A. Temporary electricity can be obtained from by tapping into existing electrical power supply at northwest side of site near proposed compressor station.

**1.04 TELEPHONE SERVICE**

- A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

**1.05 TEMPORARY WATER SERVICE**

- A. Contractor to coordinate with Owner as to availability of water source on a daily basis.
- B. Pay cost of water used.

**1.06 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures at field office.



## 1.07 BARRIERS

- A. Provide hazard barriers to prevent unauthorized entry to construction area and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Protect stored materials, site, and structures from damage.
- C. Owner will provide hazard barriers and signs to restrict public access to the overall landfill areas during construction.

## 1.08 WATER CONTROL

- A. Provide temporary silt fence, swales, properly filtered sumps, and dewatering pumps and piping as necessary to provide surface water drainage to perform Work. Refer to Section 02276 for Silt Fence Specifications.
- B. Provide water barriers, silt fences, ditch checks, as required to protect site from soil erosion, flooding, puddling, and siltation as related to Work performed.

## 1.09 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification Sections.
- B. Provide temporary and removable protection for installed Work. Control activity in immediate work area to minimize damage.
- C. Protect finished surfaces from traffic, damage, or movement of heavy objects.

## 1.10 SECURITY

- A. The site is highly visible and easily accessed by others. The site is unsecured.
- B. Provide security and facilities to protect Work from unauthorized entry, vandalism, or theft.

## 1.11 ACCESS ROADS

- A. Extend and relocate access to Work areas as Work progress requires.
- B. Provide means of removing mud from vehicle wheels before entering Forest Preserve and public roads and streets.

#### 1.12 PARKING

- A. Arrange for parking areas with Owner and Engineer to accommodate construction personnel. Contractor's employees shall not park their vehicles on Forest Preserve roads being used by the public.

#### 1.13 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove waste materials, debris, and rubbish from site periodically and arrange for disposal.

#### 1.14 FIELD OFFICES AND SHEDS

- A. Provide one trailer of sufficient size for use by the Engineer, Contractor, and Owner. This trailer shall be equipped with a telephone, lights, and 110V service.
- B. Trailer shall be located in the area at the northwest side of the site designated for the compressor station, or as directed by the Owner.

#### 1.15 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary above grade or buried utilities, equipment, facilities, and materials prior to Final Inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original or improved condition. Restore permanent facilities used during construction to specified condition.

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**SECTION 01700  
CONTRACT CLOSEOUT**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Closeout Procedures
- B. Project Record Documents
- C. Warranties
- D. Release of Liens and Consent of Surety
- E. Final Payment

**1.02 RELATED SECTIONS**

- A. Section 01016 - Health and Safety Considerations
- B. Section 01300 - Submittals
- C. Section 01500 - Construction Facilities and Temporary Controls

**1.03 CLOSEOUT PROCEDURES**

- A. Submit written certification that Contract Documents have been reviewed, that Work has been inspected, and that Work is complete and in accordance with Contract Documents.
- B. Submit final Application for Payment in accordance with the General Conditions identifying total adjusted Contract Price, previous payments, and sum remaining due.
- C. No application for final payment will be accepted until all guarantees, bonds, certificates, licenses, and affidavits required for Work, or equipment as specified, are satisfactorily filed with the Engineer.

#### 1.04 PROJECT RECORD DOCUMENTS

- A. Maintain, one set of the following Record Documents on site; record actual revisions to the work:
  - 1. Contract Drawings
  - 2. Specifications
  - 3. Addenda
  - 4. Change Orders, Contract Directives, and other modifications to the Contract
  - 5. Reviewed shop drawings and samples
- B. Record Documents shall be stored separate from documents used for construction.
- C. Record information concurrent with construction progress and submit evidence of compliance with each Payment Application.
- D. Specifications: Legibly mark and record at each product section a description of actual Products installed, including the following:
  - 1. Manufacturer's name, product model, number, and quantity(ies)
  - 2. Product substitutions or alternates utilized
  - 3. Changes made by Addenda and modifications
- E. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Field changes of dimension and detail
  - 2. Details not on original Drawings
- F. Submit documents to Engineer with final Application for Payment.

#### 1.05 WARRANTIES

- A. Provide duplicate notarized copies for all Cap Repair and LCS components and Work.
- B. Execute and assemble documents from subcontractors, suppliers, and manufacturers.

- C. Provide Table of Contents and assemble in three ring binder with durable plastic cover.
- D. Submit prior to final Application for Payment.
- E. For items of work delayed beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

#### 1.06 RELEASE OF LIENS AND CONSENT OF SURETY

- A. No application for final payment will be accepted until satisfactory evidence of Release of Liens and Consent of Surety to Final Payment has been submitted to the Owner.

#### 1.07 FINAL PAYMENT

- A. Final payment will be made to the Contractor in accordance with the General Conditions.

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## **SECTION 02110 CLEAR AND GRUB**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Clearing of landfill cap areas prior to excavating for cap repair and leachate collection system installation or placing general fill material (remove trees and brush)
- B. Chipping excavated trees, brush, vegetation, and any dead vegetation, and disposal at an area designated by the Owner.

#### **1.02 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Basis of Measurement: Clear and Grub by acre or part of acre.
- B. Basis of Payment: Includes clearing landfill cap areas, removing trees and brush, chipping and disposal in nearby wooded areas where designated.

#### **1.03 QUALITY ASSURANCE**

- A. Quality Assurance shall be as approved by Engineer.

### **PART 2 - PRODUCTS**

#### **2.01 EQUIPMENT**

- A. Equipment determined necessary by Contractor to adequately clear the work areas and chip the cleared trees and brush to the specified size.

### **PART 3 - EXECUTION**

#### **3.01 REMOVAL**

- A. Remove designated trees, brush, and vegetation from landfill cap repair and LCS areas, chip cleared brush and trees to a maximum size of six inches, and dispose where Owner designates.
- B. Disturbance of designated areas shall be kept to a minimum.

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**SECTION 02220**  
**EXCAVATING, BACKFILLING, AND COMPACTING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Excavating, backfilling, and compacting of pipe trenches including gas header piping, and excavations requirements.
- B. Excavating, backfilling, and compacting for excavated general fill soils and cap repair soils.
- C. Site preparatory earthwork required for construction includes the loosening, removing, loading, transporting, depositing, and compacting, in its final location, of all materials.
- D. Earthwork will include, but not be limited to, ditching, draining, and other required measures for the removal or exclusion of water from the excavation; backfilling all excavations and compaction of cap repair soils; stockpiling excavated materials as necessary; borrow of on-site materials to make up deficiencies for fills; and all other incidental earthwork.

**1.02 RELATED SECTIONS**

- A. Section 02270 - Erosion Control (Vegetative)
- B. Section 02684 - Horizontal Pipe Construction
- C. Section 02733 - Lift Station
- D. Section 15122 - Pipe Specialties
- E. Section 15177 - Underground Leachate Holding Tank

**1.03 UNIT PRICE - MEASUREMENT AND PAYMENT**

**A. Basis of Measurement**

- 1. Pipe trenches (excavation and backfill) by lineal foot which includes the gas header pipe cost. Other pipes are included as separate unit price items (Section 02684) by lineal foot, and include leachate gravity conveyance pipe, leachate pressure conveyance pipe, and compressed air supply line.

2. Excavation of waste is not anticipated.
3. Excavation, backfill, transporting and compaction of material for cap repair shall be priced by cubic yard of material.

B. Basis of Payment:

1. Pipe trenches: Includes excavating, placing pipe bedding, providing and placing gas header pipe, placing and compacting of backfill, yellow ribbon, and repair of the landfill cover. Other piping to be placed within trenches are described in Section 15122.
2. Excess soils shall be placed and compacted beneath existing landfill cap repair areas at a location(s) directed by Engineer. Cost includes preparation of area(s), reconsolidation, and restoration. The clay cap must be constructed and/or restored properly as defined in this Section.

#### 1.04 REFERENCES

- A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils.
- C. ASTM D698 - Test method for laboratory compaction characteristics of soil using standard effort (2400 ft-lbf/ft<sup>3</sup> (600 KN-m/m<sup>3</sup>))
- D. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 KN-m/m<sup>3</sup>)).
- E. ASTM D2216 - Standard Method for Laboratory Determination of Water (Moisture) Content in Soil, Rock, and Soil-Aggregate Mixtures.
- F. ASTM D2487 - Standard Test Method for Classification of Soils for Engineering Purposes.
- G. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- H. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- I. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.



- J. ASTM D5084 - Test method for measurement of hydraulic conductivity of saturated porous materials.

#### 1.05 QUALITY ASSURANCE

- A. Engineer shall verify that on-site clay soils are adequate for cap repair construction and/or trench cap restoration.
- B. Borrow soil shall be stockpiled on-site and verified for suitability in accordance with applicable testing requirements.

#### 1.06 SUBMITTALS

- A. For cap repair construction and LCS trench cap restoration, the engineer will conduct the following tests prior to full scale Site construction. The tests will be performed on each clay borrow source at a rate of one set of tests for each 5,000 cubic yards, or one test per borrow source.
- Standard Proctor Density Tests (ASTM D698)
  - Grain Size Distribution (ASTM D422)
  - Hydraulic Conductivity (ASTM D5084)
  - Atterberg Limits (ASTM D4318)
- B. The Contractor shall submit a grain size analysis, a five pound bag sample of the pipe bedding material, and the source and location of the bedding for approval

### PART 2 -- PRODUCTS

#### 2.01 MATERIALS

- A. Select Granular Fill (Pipe Bedding)
1. Select granular fill (for pipe bedding) as defined with a maximum P200 content of 20% and more than 90% passing the No. 4 U.S. sieve size. Generally classified as sand.
- B. Excavated existing clay cap material will be reused during cover restoration. If existing clay soils are determined unsatisfactory by the Engineer, additional clay material shall be obtained from on-site source (supplied by Owner) and will be transported to the working face by the contractor.
1. Additional clay cap material originating from different borrow sources shall be used to provide adequate volume for cap repair construction and/or trench cap

restoration and shall be tested in accordance with applicable testing requirements.

C. Compacted clay (2-ft minimum backfill for trench, Lift Station and Dripleg DL02 backfill and cap repair soils) shall consist of material meeting the following specifications:

1. A Unified Soil Classification System (ASTM D2487) designation of CL-ML, CL, or CH.
2. Moisture content not less than 2% dry of optimum value from Standard Proctor curve at time of placement.
3. Compaction to 95% of Standard Proctor maximum dry density or greater.
4. The select clay soil shall be relatively free from grass, roots, brush or other organic materials. No debris or refuse shall be present in any of the clay used on the cap. Clay shall be free from contamination. Clay shall be free of frozen materials and free from any rock or masses of unbroken earth having a maximum dimension greater than 6 inches.

D. Plastic Warning Ribbon above pipe trenches/excavations

1. Plastic warning ribbon shall be 3 in. wide, color-yellow.

E. Borrow material shall be selected to meet requirements and conditions of the particular fill for which it is to be used.

F. Clay borrow materials shall be obtained by the Owner. Borrow materials shall be subject to approval by Engineer for intended use.

## 2.02 EQUIPMENT

A. Vibratory padfoot compactor, sheepsfoot roller, or as appropriate for pipe bedding and trench backfill.

B. Hand compaction equipment for capping soil around penetrations and trenches.

C. Equipment determined necessary by Contractor to adequately spread, condition, and grade capping soil.

D. Equipment determined necessary by Contractor to adequately excavate, transport, and backfill suitable material.

E. Sheepsfoot roller for compacting of cap repair.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Protect bench marks and survey layout stakes from excavation equipment and vehicular traffic.
- C. Pipe construction shall be as specified in Section 02684.
- D. Engineer shall observe surface of subbase fill layer to confirm that no materials are present that could prevent proper placement of the compacted capping layer.
- E. Protect all existing manholes, vents and monitoring wells from damage during excavation. Where necessary, as directed by the Engineer, raise gas vents and manholes to match final grade.

### 3.02 EXCAVATION OF TRENCHES and AREAS REQUIRING CAP REPAIR

- A. Excavate to the lines and grades shown on the Drawings.
- B. Abide by all OSHA excavation and trenching regulations, and pertinent other Federal, State, and Local requirements.
- C. For LCS, excavate for inlet and outlet structures to provide a minimum clearance of 12 in. from vertical surfaces to face of excavation.
- D. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- E. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- F. Remove unstable material and replace with general fill, as directed by Engineer.
- G. Correct unauthorized excavation at no extra cost to Owner.
- H. Correct areas over-excavated by error at no additional cost to Owner.
- I. Stockpile and segregate excavated soil or refuse adjacent to trench.
- J. Protect existing structures and buried utilities, including storm sewers, during excavation for cap repair.

K. Maintain orderly excavating plan while moving stockpiles.

### 3.03 PREPARATION FOR BACKFILL

- A. Compact subgrade to density requirements specified.
- B. Undercut soft areas of excavations/trenches a minimum of 6 in. and backfill with general fill. Compact to a density equal to or greater than the requirements specified.
- C. In cap repair areas, scarify subgrade to a depth of six inches to key in first lift of clay cap soils.

### 3.04 BACKFILLING

- A. Backfill areas to required contours and elevations with unfrozen materials.
- B. Do not backfill over standing water or frozen or spongy subgrade surfaces.
- C. Pipe bedding:
  - 1. Spade or shovel-slice pipe bedding material under the pipe haunches.
  - 2. Place pipe and bedding to depth shown on the Drawings.
  - 3. Backfill with remaining specified material above pipe bedding.
- D. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Make grade changes gradual. Blend slope into level areas. Maintain positive drainage and control erosion.

### 3.05 CLAY PLACEMENT

- A. Place material to the depths indicated above and on Drawing details in lifts parallel to the surface. Do not exceed compacted lift thickness of 6 in. and compact to required density. Break apart clay clods.
- B. Moisture conditioning of too dry clay (too wet clay will be dried on-site ) and placement of material within limits of clay placement as directed by the Engineer. Maintain moisture content of compacted soil to prevent desiccation by periodically spraying soils with water, if necessary.

- C. Compact material on the wet side of optimum as determined by ASTM D1557.
- D. Remove excessively dry or wet clay before placement of additional lifts.
- E. Use a sheepsfoot roller or other adequate equipment to blend each lift into previously placed lift, or scarify previous lift prior to placing subsequent lifts to achieve bonding between lifts.
- F. Place clay while air temperatures are above 32° F, unless otherwise approved by the Engineer. Do not place any frozen material.
- G. Seal clay surface or cover pipe trenches with remaining backfill at the completion of each working day to minimize moisture infiltration.
- H. Maintain nominal slope for positive drainage.

### 3.06 RESTORATION

- A. Restore site surfaces for positive drainage.

### 3.07 TOLERANCES

- A. Construct backfilled trenches and cap repair areas to tolerance of plus 2 in.
- B. Construct backfilled open areas, drainage swales and berms to tolerance of plus or minus 3 in.

### 3.08 FIELD QUALITY CONTROL

- A. Field observation and testing shall be performed by Engineer.
- B. Tests and analysis of fill material may be performed in accordance with ASTM C136 or ASTM D422, as appropriate.
- C. Engineer shall confirm compactive effort used for compacted clay capping layer placed within the limits of construction on an approximate 200-ft grid (minimum of one test per acre) for each 6-in. thickness placed, or at 100 lf intervals along pipe trenches. Compactive effort shall be tested using nuclear methods (ASTM D2922 and D3017).
- D. Refer to Construction Quality Assurance Plan (CQAP) for additional information.

### 3.09 CLAY CAP PENETRATIONS

A. Backfill the following in the compacted clay layer:

1. Nuclear density probe-hole locations.
2. Other perforations/disturbances as directed by Engineer.

B. Backfill Material:

1. Backfill penetrations with granular bentonite, unless otherwise directed by Engineer.
2. Contractor shall provide granular bentonite.

C. Clay soils shall be used directly on top of the excavated areas, as shown on the Drawings. Placement of cap repair clay soils shall be a minimum 2 feet thick total, measured in a compacted state. The clay cap surface shall be smoothed sufficiently without erratic depressions or mounds, such that the topsoil layer can be placed with minimum additional effort. In cut areas, primarily at the perimeter of the cover, where the cover will tie into the existing surface, the subsurface shall be scarified to a minimum depth of 6 inches and recompact.

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**SECTION 02270**  
**EROSION CONTROL (VEGETATIVE)**

**PART 1 - GENERAL**

**1.01 Summary**

- A. Seed varieties and quantities shall be uniformly distributed over all ground areas disturbed by grading and/or excavation from Cap Repair and/or LCS construction, as shown on the Drawings and as directed by the Engineer.
- B. Contractor shall notify the Engineer at least 2 weeks prior to seeding operations. This requirement shall include, but not be limited to, seedbed preparation, fertilizer application, seed application, mulch placement and maintenance for one year.

**1.02 Submittals**

- A. Engineer approval is required for the following submittals prior to initiation of seeding activities. The following shall be submitted in accordance with Section 01300 - "Submittals":
  - 1. Manufacturer's literature discussing physical characteristics, application and installation instructions for erosion control material, including silt checks.
  - 2. A list of proposed seeding and mulching equipment to be used in performance of seeding operation, including descriptive data and calibration tests.
  - 3. Delivery schedule, at least 10 days prior to the intended date of the first delivery.
  - 4. Written record of all maintenance work performed during the seeding establishment period shall be submitted to the Engineer.
  - 5. Certificates of compliance certifying that materials meet the requirements specified, prior to the delivery of materials. Certified copies of the reports for the following materials shall be included:
    - a) For mixture, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, date tested, and state certification.
    - b) A test of Agricultural limestone for calcium carbonate equivalent and a sieve analysis for fineness.

- c) Soil amendments shall be delivered to the Site in the original, unopened containers bearing the manufacturer's chemical analysis and percent composition. A chemical analysis shall be provided for fertilizer(s) bulk deliveries.

#### 1.03 Delivery, Inspection, Storage, and Handling

- A. Delivery: Notify the Engineer, in writing, 10 days prior to the first delivery.
- B. Inspection: Seed shall be inspected upon arrival at the job site by the Engineer for conformity to type and quality in accordance with Paragraph 2.1. Topsoil, Fertilizer, and Lime shall be inspected for meeting specified requirements and unacceptable materials shall be removed from the job site.
- C. Storage: Materials shall be stored in their original containers in areas designated by the Engineer. Seed, lime, and fertilizer shall be stored in cool, dry locations away from contaminants and ponded water.
- D. Handling: Materials shall not be dropped or dumped from vehicles. All materials shall be handled so that spills or releases from the original containers are eliminated.

### PART 2 - PRODUCTS

#### 2.01 Materials

##### A. Seed

- 1. Classification: State approved seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material.
- 2. Seed Mixtures: Seed mixtures for permanent cover shall be in accordance with Illinois Department of Transportation Specification 4A for low-profile native grasses.
- 3. Temporary Cover: Where requested by the Engineer or required to reduce erosion, temporary cover may be planted using 150 pounds per acre of wheat or rye for fall planting or 100 pounds per acre of spring oats for spring planting.

- B. Soil Amendments: Soil amendments shall consist of Fertilizer meeting the following requirements.



1. Lime: Lime shall be agricultural limestone and shall have a minimum calcium carbonate equivalent of 90 percent or as determined by Owner.
2. Fertilizer: Fertilizer shall be commercial grade, free flowing, low in salts, uniform in composition or as determined by Owner.
- C. Topsoil: Adequate topsoil shall be furnished by the Owner and shall be a natural, friable soil representative of productive soils in the vicinity, and approved by the Engineer.
- D. Mulch: The Contractor shall use hay or straw fixed in place with Mechanical Anchoring Equipment, on all surfaces with slopes shown on the Drawings to be less than 5 horizontal to 1 vertical.
- E. Water: Water shall not contain elements toxic to plant or animal life.
- F. Erosion Control Material:
  1. Erosion control matting shall be classified as a 70 percent straw, 30 percent coconut fiber erosion control mat with polynet fiber and/or cotton string for holding material in place. Minimum weight of matting shall be 0.5 pounds/square yard. All staples used to fasten the Fabric in place shall be heavy-duty, 6-inch, U-shaped wire staples.
  2. Approved or equal manufacturers of matting are:
    - Erosion Control Systems
    - BonTerra America, Inc.
    - American Excelsior Company
    - North American Green
  3. A bonded fiber matrix may be substituted for the matting in some or all site locations, with Engineer approval.

## PART 3 - EXECUTION

### 3.01 Seeding Times and Conditions

- A. Field Seed: Seed shall be sown for fall planting from August 15 to September 30, and for dormant planting (avoid if possible) from October 20 to the first freeze.
- B. Environmental Conditions: Seeding operations shall be performed only during periods when beneficial results can be obtained.

### 3.02 Site Preparation

A. Grading: The Engineer shall verify that finished grades are as indicated on the drawings, and that placing of topsoil and smooth grading have been completed in accordance with specifications Section 02220.

B. Tillage

1. Minimum Depth: Soil on slopes gentler than 3-horizontal-to-1-vertical shall be tilled to a minimum depth of 6 inches prior to seeding.

C. Finished Grading

1. Preparation: Seeding areas shall be filled as needed or have surplus soil removed to attain the finished grade. Drainage patterns shall be maintained as indicated on drawings.
2. Protection: Finished graded areas shall be protected from damage by vehicular or pedestrian traffic and erosion.

D. Application of Soil Amendments

1. Soil Test: A soil test shall be performed for pH, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of grass specified.
2. Lime: Lime shall be applied at a rate recommended by the soil test.
3. Fertilizer: Fertilizer shall be applied at the rate recommended by the soil test.

### 3.03 Seeding

A. General: Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rain, traffic or other cause, shall be reworked to restore the ground condition previously specified. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

B. Equipment: The equipment to be used and the methods of seeding shall be subject to the inspection and approval of the Engineer prior to commencement of seeding operations. Immediately prior to the commencement of seeding operations, the Contractor shall conduct seeding equipment calibration tests in the presence of the Engineer.

### 3.04 Erosion Control Material

- A. The surface of excavated LCS and cap repair areas steeper than 5H:1V shall receive soil erosion control material and shall be finished to a smooth and even condition with all debris, roots, stones and lumps raked out and removed.
- B. Erosion Control Blanket: Soil erosion control blanket shall be unrolled on newly seeded areas with slopes greater than 5H:1V, or as directed by engineer. Apply wire staples vertically through the netting and blanket into the ground, keeping netting taut against anchor staples.
- C. Silt Checks: Silt checks, consisting of straw bales, rocked berms or sand-filled geosynthetics, shall be installed where indicated on the Drawings and in those areas required by the Engineer for control of rill or gully erosion. Anchors, if any, used for the silt checks shall not compromise the integrity of any landfill cover components.
- D. Maintenance: The erosion control material and silt checks shall be maintained until all work on the entire contract or designated portion thereof has been completed and accepted and during the seeding establishment period.

### 3.05 Restoration and Clean Up

- A. Restoration: Existing seeding areas, pavements and facilities that have been damaged from the seeding operation shall be restored to original condition at Contractor's expense.
- B. Clean Up: Excess and waste material shall be removed from the planting operation and shall be disposed of off site.

### 3.06 Protection of Seeded Areas

- A. Immediately after seeding operations have been completed, the area shall be protected against traffic or other use by erecting barricades and providing signage as required or as directed by the Engineer to provide protection against traffic and trespass.

### 3.07 Seeding Establishment Period

- A. Commencement: The Seeding Establishment Period for establishing a healthy stand of vegetation shall begin on the first day of Work under this contract and shall end 365 days after the last day of mulching operations required by this contract or until all Work on this entire Contract has been completed and accepted, whichever period is longer.

B. Repair: The Contractor shall re-establish as specified herein, eroded, damaged or barren areas. Mulch shall also be repaired or replaced as required.

C. Maintenance Report: A written record shall be furnished to the Engineer of the maintenance work performed.

### 3.08 Final Acceptance

A. See Specification Section 01400 - Quality Control for final inspection and acceptance.

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## **SECTION 02276 SILT FENCE**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Supply, install, maintain, and remove silt fence.

#### **1.02 RELATED SECTIONS**

- A. Section 01500 - Construction Facilities and Temporary Controls

#### **1.03 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Basis of Measurement: Silt fence by lineal foot installed.
- B. Basis of Payment: Includes supplying, installing and maintaining silt fence to locations shown on Drawings.

#### **1.04 DEFINITIONS AND REFERENCES**

- A. ASTM D4355 - Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon - Arc Type Apparatus).
- B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- C. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- D. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.

### **PART 2 - PRODUCTS**

#### **2.01 MATERIALS**

- A. Silt fence shall consist of woven geotextile secured to 4-ft long, 1-½ in. by 1-½ in. hardwood posts on 7-ft centers with tension nylon cording and reinforcing net.
- B. Woven geotextile properties shall meet the following minimum average roll values:

<u>Property</u>	<u>Units</u>	<u>Value</u>	<u>Test</u>
Tensile Strength	lb	90	ASTM D4632
Apparent Opening Size (AOS)	NA	No. 20	ASTM D4751
Permittivity	sec <sup>-1</sup>	0.01	ASTM D4491
Ultraviolet Degradation	% strength retained after 500 h exposure	70	ASTM D4355

C. Reinforcing net shall be industrial polypropylene with maximum mesh spacing of 3/4 in.

D. Wire staples shall be 1.5 in. minimum length No. 9 staples.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install silt fence around all affected drainage outlets and around areas of construction as directed by Engineer.
- B. Dig a 6 in. by 6 in. trench at these locations.
- C. Drive hardwood posts 12 in. deep, 7-ft centers, below base of trench on the downslope of the trench.
- D. Securely fasten the tension nylon cording and reinforcing net to the posts.
- E. Stretch geotextile tight between posts.
- F. Staple geotextile to posts with wire staple.
- G. Drop geotextile in trench and cover with excavated soils and compact.

#### 3.02 MAINTENANCE

- A. Inspect silt fence after every rainfall event.
- B. Correct any deficiencies.

C. Remove excessive sediment deposits as determined by Engineer.

D. Replace damaged silt fence at no cost to Owner. Engineer shall determine damaged silt fence.

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## **SECTION 02505 AGGREGATE PAVING**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Compacted crushed aggregate paving materials (surface and base course) for compressor station/tank loadout access and lift station access road areas.

#### **1.02 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Basis of Measurement: By square yard.
- B. Basis of Payment: Includes supplying, placing, and compacting material at lift station and compressor station/tank areas. Materials include surface course and base course aggregates.

#### **1.03 DEFINITIONS AND REFERENCES**

- A. ASTM C136 - Standard Method for Sieve Analysis of Fine and Course Aggregates.
- B. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).

#### **1.04 SUBMITTALS**

- A. Provide Engineer with written documentation that crushed aggregate used for access areas meets the material specifications in Part 2.

#### **1.05 QUALITY ASSURANCE**

- A. General: Provide a smooth final surface of uniform density conforming to required grade and cross section.
- B. Density: Compact the subgrade to the degree that there will be no appreciable displacement of the material laterally or longitudinally under the compaction equipment.
- C. Aggregate Thickness
  - 1. Construct to compacted thickness indicated on Drawings.



2. Thickness deficiency greater than 1/2 in. shall be corrected by placing additional crushed aggregate.

D. Surface Smoothness

1. Check surface smoothness at intervals directed by Engineer.

- E. Testing to confirm crushed aggregate thickness, line, grade, gradation, soundness, abrasion resistance, and/or degree of compaction may be performed at the discretion of the Engineer or Owner.

1.06 JOB CONDITIONS

A. Weather Limitation

1. Do not place crushed aggregate on frozen subgrade or subgrade covered with ice or snow.
2. Do not place crushed aggregate on excessively wet subgrade.
3. Do not place crushed aggregate on dry and dusty subgrade. An excessively dry subgrade shall be watered, and shall be reworked or recompacted, if necessary.

PART 2 - PRODUCTS

2.01 CRUSHED AGGREGATE (SURFACE COURSE)

- A. Crushed aggregate material shall meet the following gradation requirements or equivalent. This material shall be used also for lift station backfill - Section 02733.

Percent by Weight Passing

<u>U.S. Standard Sieve SizeCrushed Gravel</u>		<u>Crushed Stone</u>
1½ Inch	100%	100%
1 Inch	75-100	-
¾ Inch	-	-
⅜ Inch	40-75	30-65
No. 4	30-60	25-55
No. 10	20-45	15-40
No. 40	10-30	-
No. 200	3-10	2-12

- B. The aggregate shall consist of hard, durable particles of crushed stone or crushed gravel and a filler of natural sand, stone sand, or other finely divided mineral matter. The composite material shall be substantially free from vegetable matter, shale, and lumps of clay.

## 2.02 BASE COURSE MATERIAL

- A. Base course material shall be 3-in. crushed aggregate material with fines (i.e., 3-in. breaker run). The composite material shall be substantially free from vegetable matter, shale, and lumps of clay.

## 2.03 EQUIPMENT

- A. The weight, type, capacity, and method of operation of all hauling, spreading, and compacting equipment shall be such that no damage will result to the subgrade or aggregate in place. Spreading equipment shall not significantly segregate the aggregate.

# PART 3 - EXECUTION

## 3.01 LINES AND GRADE

- A. The lines, grade, and cross section shall be constructed as shown on the Drawings or as directed by the Engineer or Owner.

## 3.02 EXAMINATION

- A. Engineer shall confirm that compacted subgrade is firm and ready to receive work by visual observation during proof-rolling.

## 3.03 SURFACE PREPARATION

- A. Strip topsoil and other soils as needed to reach subgrade.
- B. Fill any ruts or depressions prior to aggregate placement.
- C. Grade for positive drainage.

## 3.04 PLACEMENT OF CRUSHED AGGREGATE PAVING

- A. After placement and compaction of base course aggregate, place surface course aggregate and compact to minimum thicknesses as indicated on Drawings.
- B. Construct access areas to the lines and grades shown on Drawings.

- C. Compact placed aggregate material to a minimum density of 90% of the maximum dry density determined by modified Proctor (ASTM D1557) to full depth. Segregation of material shall not be permitted.
- D. Add water if required to assist compaction. If there is excess water, rework topping and aerate to reduce moisture content.
- E. Perform hand tamping in areas inaccessible to self-propelled or tow-behind compaction equipment.
- F. Do not place crushed aggregate on frozen subgrade or subgrade covered with ice or snow.
- G. Do not place crushed aggregate on excessively wet subgrade.

### 3.05 TOLERANCES

- A. Access areas shall be constructed to a thickness tolerance of plus 6 in.

### 3.06 QUALITY CONTROL

- A. Engineer may collect samples of crushed aggregate for laboratory testing.
- B. Engineer shall survey the final access areas for grade.

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**SECTION 02684**  
**HORIZONTAL PIPE CONSTRUCTION**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Supply and install leachate gravity conveyance pipe
- B. Supply and install leachate pressure conveyance pipes
- C. Supply and install header risers/cleanouts including blower riser
- D. Supply and install compressed air line
- E. Supply and install control wires

**1.02 RELATED SECTIONS**

- A. Section 02220 - Excavating, Backfilling, and Compacting
- B. Section 16900 - Instrumentation and Control System

**1.03 UNIT PRICE - MEASUREMENT AND PAYMENT**

**A. Basis of Measurement:**

- 1. Leachate gravity conveyance pipe by lineal foot of pipe installed
- 2. Leachate pressure conveyance pipe by lineal foot of pipe installed.
- 3. Header risers/cleanouts (includes blower riser) by each.
- 4. Compressed air line by lineal foot of pipe installed.
- 5. Control wires by lineal foot of wire installed.

Note that the gas header pipe is included with trenching costs (Section 02220).

**B. Basis of Payment:**

- 1. Leachate gravity conveyance pipe includes supplying and installing pipe.
- 2. Leachate pressure conveyance pipe includes supplying and installing pipe.
- 3. Header risers/cleanouts includes supplying and installing pipe.
- 4. Compressed air line includes supplying and installing pipe.

5. Control wires include supplying and installing an individual control wire from each well and lift station pump, in the pipe trench, to the control building.

#### 1.04 DEFINITIONS AND REFERENCES

- A. ASTM D3350, PE 34543C - Polyethylene plastic pipe and fittings materials. HDPE pipe and fittings.
- B. ASTM D1248 PE 3408 - Polyethylene plastic moldings and extrusion materials. HDPE pipe and fittings.
- C. ASTM D3261 - Butt heat fusion polyethylene (PE) plastic fittings for polyethylene (PE) plastic pipe and tubing.

#### 1.05 SUBMITTALS

- A. Furnish to Engineer the Manufacturer's product literature, including but not limited to dimensions, sizes, seals, and connections, pressure rating and installation instructions.
- B. No fabrication or ordering shall occur until shop drawings are reviewed by the Engineer.

#### 1.06 QUALITY ASSURANCE

- A. All pipe, fittings, wire, and wire hardware, shall be new and unused.
- B. Each length of pipe shall be clearly marked with Manufacturer's name, the type and class of pipe.
- C. A guarantee of one year minimum after acceptance by Owner of all equipment, materials, and workmanship to be free from defect and that the system will operate without excessive noise, vibration, or uncontrolled expansion.
- D. Replacement or repair shall be at no cost to Owner.

### PART 2 - PRODUCTS

#### 2.01 PIPE MATERIAL

- A. All piping shall be sized as shown on the Drawings.

- B. HDPE pipe and fitting shall be SDR 17 (or lower SDR) Driscopipe 6400 high density polyethylene, conforming to ASTM D-1248, PE 3408 and ASTM D-3350, PE 3453C, or other as approved. Joints shall be butt fused in conformance with ASTM D-3261 and pipe manufacturer's recommendations. Connections to existing HDPE piping can be made by computer controlled electrofusion method and equipment as manufactured by Central Plastics Company or equal.
- C. All flange connections shall be made with full face neoprene gaskets.

## 2.02 PIPE BEDDING MATERIAL

- A. Header pipe bedding material shall be pipe bedding as specified in Section 02220 - Excavating, Backfilling, and Compacting.
- B. Control Wires shall be installed within conduits suitable for outdoor or underground installation, where applicable. Conduits shall be sufficiently secured using bracketing devices. Raceways shall be used for securing all wiring in all control enclosures and where wiring is accessible. All wiring shall be labeled and label identification shall be provided on electrical and control drawings. All wiring shall meet the requirements in Specifications Sections 16000 and 16900.

## 2.03 CONTROL WIRES

- A. Control wires materials shall be as specified in Section 16900 - Instrumentation and Control Systems and per supplier's recommendations, all subject to Engineer approval.

# PART 3 - EXECUTION

## 3.01 EXAMINATION

- A. Engineer shall document that pipe trenches are suitable for placement of pipe.
- B. Prior to installation and backfill, sections of all piping (including gas header) shall be pressure tested. A pressure of 3.0 psig shall be applied to the pipe and after 30 min show a pressure drop of no more than 5% and to be accepted by the Engineer. Leakage and pressure tests shall be performed in the presence of the Engineer or Owner. Contractor shall give 48 hr notice to Engineer prior to testing. A written report shall be prepared by the Engineer and signed by the Contractor for each test. Contractor shall provide all gauges, pumps, pipe, connections, and all other necessary apparatus to conduct tests. If results of tests performed do not conform to requirements as stated herein, Contractor shall make the necessary repairs and repeat tests as required until satisfactory results are obtained.

### 3.02 LINES AND GRADE

- A. All pipe shall be laid to the lines and grades shown on the drawings or given by the Engineer. The Contractor shall be responsible for the preservation of stakes when set and, if disturbed, shall pay the actual cost of having stakes reset.
- B. The Contractor shall notify the Engineer at least 48 hr in advance of the need for line and grade stakes.
- C. All fittings, valves and appurtenances shall be located as shown on the Drawings or as directed by the Engineer.

### 3.03 INSTALLATION

- A. All pipes shall be fully protected to prevent earth or other substances from entering the pipe. Not more than 200 ft of trench shall be opened in advance of pipe laying unless permitted by the Engineer.
- B. The extraction trenches shall be constructed according to the Drawings and specifications Section 02220 - Excavating, Backfilling, and Compacting. Extraction trench construction includes trench riser pipe to the point of wellhead connection.
- C. The gas header pipes, and the two driplegs shall be installed according to the Drawings and Specifications Section 02220 - Excavating, Backfilling, and Compacting. Gas header pipe includes riser pipe to the point of wellhead connection and header pipe to the buried leachate tank and blower riser. The gas and leachate header pipe also includes the cleanouts. Each cleanout and gas header riser includes an HDPE blind flange with a full face neoprene gasket.
- D. Install HDPE pipe with fusion joints.
- E. Shovel-slice pipe bedding around haunches of gas header pipe.
- F. All header pipe will be surveyed by the Engineer for location and elevation prior to backfill.
- G. Header pipe connections to related system equipment shall be in accordance with Section 15122 - Pipe Specialties.
- H. Trench construction, pipe installation, bedding, and backfilling shall be performed from the ground surface and includes use of the existing vaults at each well. The vaults are currently in-place at each well top. The wellheads must be installed properly within the vaults as per Contractors' means and methods.

I. Repair cover system as necessary, including installation of the surface vaults, in accordance with Section 02223 - Compacted Clay and Section 02220 - Excavating, Backfilling, and Compacting.

J. After construction, flush all pipes with clean water to remove construction debris.

#### 3.04 TOLERANCES

A. On the vertical plane, pipe inverts shall be installed to a tolerance of plus or minus 0.1 ft from that shown on the drawings or as directed by the Engineer. Pipe slopes shall not be less than 3% in the direction shown on the Drawings.

B. On the horizontal plane, all pipe shall be installed to a tolerance of plus or minus 1.0 ft.

#### 3.05 FIELD QUALITY CONTROL

A. Engineer may collect samples of pipe bedding for laboratory testing.

B. Engineer shall document pipe invert elevation at every pipe connection and coordinates at all pipe corners, bends, and grade changes.

C. Engineer shall document pipe pressure tests.

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## **SECTION 02733 LIFT STATION**

### **PART 1 - GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Supply and install lift station complete with sump, pump, piping, control system, and other appurtenances

#### **1.02 RELATED SECTIONS**

- A. Section 02220 - Excavating Backfilling, and Compacting
- B. Section 02684 - Horizontal Pipe Construction
- C. Section 02505 - Aggregate Paving

#### **1.03 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Basis of Measurement: Lift station by lump sum, including access road subbase.
- B. Basis of Payment:
  - 1. Supply and install sump, pump, piping, control system, and other appurtenances including excavation and backfill for lift station and for access road subbase.
  - 2. Place and compact clay by cubic yard of compacted clay to a minimum depth of 2 ft below and around lift station (if bottom clay liner is compromised) to the top of the existing clay liner as shown on Drawings for lift station. A survey by a licensed surveyor, and the Engineer and Contractor shall determine the volume of compacted clay.
  - 3. Access road subbase material shall be excess suitable soils from LCS construction or as supplied by Owner.

#### **1.04 SUBMITTALS**

- A. Submit product data to Owner at least ten days prior to installation.

#### **1.05 QUALITY ASSURANCE**

- A. Quality assurance shall be as approved by Engineer.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. Lift Station

Lift station to include:

1. One pneumatic submersible pump (Anchor Pump Model No. 102) by Blackhawk Environmental
2. High capacity air control motor
3. A check valve and isolation valve
4. The lift station pump and associated equipment shall be supplied by Bertane, or approved equivalent by Engineer.
5. Sump shall be SDR-11 HDPE 24-in. diameter pipe and as shown on the Drawings.

#### B. Electrical Controls

1. The lift station pump will be operated with the same compressed air supply line as that feeding the wells pumps and controlled from the compressor building.
2. The liquid volume pumped from the lift station shall be metered using a pump stroke counter (as part of a bubbler/liquid level system) and the meter shall include the capability to transmit the pump counter value to the control/compressor building.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Excavate and backfill in accordance with this section and Section 02220.

### 3.02 INSTALLATION

- A. Install sump, pump, piping, and accessories to provide for removal of pump for maintenance without entering manhole.
- B. Install according to manufacturer's recommended instructions.

### 3.03 INSPECTION

- A. Check, align, inspect before start-up.
- B. Start-up and field test the completed installation prior to final completion.

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**SECTION 02831**  
**CHAIN LINK FENCES AND GATES**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Supply and install fence, poles, foundations, and gates

**1.02 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Basis of Measurement: By lineal foot.
- B. Basis of Payment: Includes excavation and concrete for posts, posts, rails, top rails, fabric, accessories, attachments, hardware, and installation. Fence shall be installed around compressor/tank area as shown on Drawings.

**1.03 DEFINITIONS AND REFERENCES**

- A. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless. For Ordinary Uses.
- B. ASTM A123 - Zinc (Hot Galvanized) Coatings of Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars and Strips.
- C. ASTM A392 - Zinc-Coated Steel Chain-Link Fence Fabric.
- D. ASTM F567 - Installation of Chain-Link Fence.
- E. ASTM C94 - Ready-Mixed Concrete.

**1.04 SUBMITTALS**

- A. Submit shop drawings and product data.
- B. Include plan layout, grid, spacing of components, accessories, fittings, hardware, anchorages, and schedule of components.
- C. Submit manufacturer's installation instructions.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer: Company specializing in commercial quality chain link fencing with at least two years experience.

- B. Installation: ASTM F567.

## 1.06 LAYOUT

- A. Owner will perform layout for locations of fencing and gates.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

- A. Framework: ASTM A120; Schedule 40 steel pipe.
- B. Fabric: Type ASTM A392, zinc-coated steel.

### 2.02 CONCRETE MIX

- A. Concrete: ASTM C94; normal Portland Cement; 2500 psi at 28 days; 3 inch slump; 1 1/2 in. sized aggregate.

### 2.03 COMPONENTS

- A. Line Posts: 2 in. O.D. steel pipe.
- B. Corner and Terminal Posts: 2-1/2 in. O.D. steel pipe.
- C. Gate Posts: 4 in. O.D. steel pipe.
- D. Top and Brace Rail: 1-5/8 in. O.D., plain end, sleeve coupled steel pipe.
- E. Gate Frame: 2 in. O.D. diameter steel pipe for welded fabrication.
- F. Fabric: 2 in. diamond mesh steel wire, interwoven, 9 gage thick, top selvage twisted tight, bottom selvage knuckle end closed.
- G. Caps: Cast steel or malleable iron, galvanized; sized to post dimension, set screw retained.
- H. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings: Steel.
- I. Gate Hardware: Fork type latch with gravity drop for single leaf; Center gate stop and drop rod for double leaf; Mechanical keepers; Three 180 degree gate hinges per leaf and hardware for padlock.

## 2.04 FINISHES

- A. Galvanized Pipe: ASTM A123; 1.8 oz/sf coating.
- B. Galvanized Fabric - ASTM A123; 1.2 oz/sf coating.
- C. Accessories: Same finish as framing.
- D. All fence pipe, fabric and accessories shall be coated with heavy gauge black vinyl.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567 in locations as indicated on Drawings.
- B. Provide fence 8 ft nominal height at location shown on Drawings.
- C. Provide 12-ft wide slide gate at compressor/tank station.
- D. Space line posts at intervals not exceeding 10 ft.
- E. Set all line posts below finish grade in accordance with ASTM F567 requirements.
- F. Set all corner, terminal, and gate posts plumb in concrete footings with top of footings 2 in. above finish grade. Slope top of concrete away from post. Provide footings as follows:  
  
Corner and Terminal Posts - 9 in. diameter by 36 in. depth.  
Gate Posts - 18 in. diameter by 36 in. depth.
- G. Provide top brace pipe rail at fence top.
- H. Brace each gate and corner post back to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.
- I. Install center and bottom brace rail on corner and gate leaves.
- J. Stretch fabric between terminal posts or at intervals of 100 ft maximum, whichever is less.

- K. Position bottom of fabric at finished grade where possible.
- L. Provide tension wires as necessary.
- M. Attach fabric to end, corner, and gate posts, and top brace rail, with tension bars and tension bar clips.
- N. Provide concrete center drop to foundation depth and drop rod retainers at center of double gate openings.

### 3.02 FIELD QUALITY CONTROL

- A. Engineer shall survey installed fence and gates at each corner post.

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**SECTION 03300**  
**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.01 DESCRIPTION**

A. Provide cast-in-place concrete foundation for compressor station building, ballast for buried leachate holding tank, and transformer pad.

B. Scope

1. Provide all materials, labor, services and incidentals necessary for completion of the Work.
2. Cast-in-place concrete required for this Work is indicated on the Drawings and includes, but is not necessarily limited to:
  - a. Foundation (slabs and footings as necessary)
  - b. Deadweights for buried tank ballast
  - c. Transformer pad including conduits for buried electrical service.
3. All steel reinforcing and formwork related to cast-in-place concrete and sand bedding layers.
  - a. Reinforcement for building foundation shall be as specified by supplier.
  - b. Reinforcement for deadweights shall be two No. 4 steel reinforcement bars the full length of each.

C. Description of Requirements

1. Cast-in-place concrete Work shall be in accordance with the requirements of ACI 301-"Specifications for Structural Concrete for Buildings" except as modified herein.
2. Transformer pad specifications are available from Commonwealth Edison (Ms. Diane Bowen, Telephone Number (630) 691-4393)

**1.02 RELATED SECTIONS**

A. Section 15122 - Pipe Specialties



B. Section 02505 - Aggregate Paving

1.03 QUALITY ASSURANCE

- A. Provide at least one person who shall be present at all times during execution of this portion of the Work and who shall be thoroughly familiar with the type of materials being installed, the referenced standards, and the requirements of this Work, and who shall direct all Work performed under this Section.
- B. Redi-Mix Concrete Supplier: Employing experienced personnel regularly engaged in producing redi-mix concrete.
- C. Engineer may, at his discretion, make concrete test cylinders in accordance with ACI 301, so as to provide a strength test at the expense of Owner. Contractor shall coordinate with and assist Engineer as needed for the making of test cylinders.
- D. Codes and Standards:
  - 1. All referenced standards are to be of their most recent edition.
  - 2. In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations contained in "Recommended Practice for Concrete Formwork" publication ACI 347 of the American Concrete Institute, "Manual of Standard Practice for Detailing Reinforced Concrete Structures," publication ACI 315 of the American Concrete Institute; and "Structural Concrete for Buildings", publication ACI 301 of the American Concrete Institute.
  - 3. Where provisions of pertinent codes and standards conflict with the requirements of this Section of these Specifications, the provisions requiring the higher level of performance shall govern.

1.03 SUBMITTALS

- A. Submit proposed mix designs and supporting data to the Engineer for approval at least 10 days before the start of any concrete Work, if requested by Engineer.
- B. Transit-Mix Delivery Slips:
  - 1. Keep a record at the job site showing time and place of each pour, together with transit-mix delivery slip certifying contents of the pour.
  - 2. Make the record available to the Engineer for his inspection upon request.

## 1.04 PRODUCT HANDLING

### A. Protection:

1. Use all means necessary to protect formwork, concrete reinforcement, and cast-in-place concrete materials before, during, and after installation, and to protect the installed Work and materials of all other trades.

### B. Replacements:

1. In the event of damage, immediately make all repairs and replacements necessary to the satisfaction of the Engineer and at no additional cost to the Owner.

## PART 2 - PRODUCTS

### 2.01 FORM MATERIALS:

#### A. Form Lumber:

1. Wood: Clean straight lumber, dressed on face and edges, 1 in. nominal thickness.
2. Plywood: 5/8" or 3/4" thick, EXT-DFPA.
3. Metal: Smooth, as large size as possible.

#### B. Form Sealers:

1. All form sealers shall be first-quality of their respective kinds and subject to the approval of the Engineer.

### 2.02 TIES AND SPREADERS:

#### A. Type:

1. All form ties shall be a type that does not leave an open hole through the concrete, and which permits neat and solid patching at every hole.

#### B. Design:

1. When forms are removed, all metal shall be not less than 1" from the surface.

C. Wire ties and wood spreaders:

1. Do not use wire ties and wood spreaders.

2.03 ALTERNATE FORMING SYSTEMS

- A. Alternate forming systems may be used subject to the advance approval of the Engineer.

2.04 CONCRETE REINFORCEMENT

- A. All concrete reinforcement materials shall be new, free from rust, and comply with the following reference standards:

1. Bars for reinforcement: ASTM A615 Grade 60
2. Wire for reinforcement: ASTM A82

2.05 CONCRETE

A. General:

1. All concrete, unless otherwise specifically permitted by the Engineer, shall be transit-mixed in accordance with ASTM C-94.

B. Mixes:

1. Mixture proportions: Chapter 3, ACI 301.
2. All concrete shall have a minimum compressive strength of 4000 psi within 28 days. Maximum slump shall be 4 inches.
3. Air Entraining Admixtures: Use in all concrete - ASTM C 260. Air entrained concrete shall contain 4% to 6% air by volume.
4. All cement shall be Portland Cement conforming to ASTM C150, Type I and shall be the product of one manufacturer.
5. All aggregates shall conform to ASTM C33.
6. All water shall be clean and free from deleterious matter.
7. Minimum cement content; 6 bags per cubic yard.

## 2.06 NON-SHRINK GROUT

- A. Premixed compound with non-metallic aggregate, cement, water reducing and plasticizing agents; capable of minimum compressive strength of 2,400 psi.

## 2.07 OTHER MATERIALS

- A. All other materials, not specifically described but required for proper completion of all cast-in-place concrete, shall be as selected by the Contractor subject to the advance approval of the Engineer.

## PART 3 - EXECUTION

### 3.01 INSPECTION

- A. Prior to all Work of this Section, carefully inspect the installed Work of all trades and verify that all such Work is complete to the point where this installation may properly commence.
- B. Verify that all items to be embedded in concrete are in place.
- C. Do not proceed with installation in areas of discrepancy until unsatisfactory conditions are corrected.

### 3.02 FORMWORK

#### A. General

1. Construct forms in accordance with ACI 347.
2. Construct all required forms to be substantial, sufficiently tight to prevent leakage of mortar, and able to withstand excessive deflection when filled with wet concrete.
3. Form for all required cast-in-place concrete to the shapes, sizes, lines and dimensions indicated on the Drawings.
4. Coat forms in accordance with manufacturer's recommendations, prior to placing reinforcing to provide for removal of forms without damaging surface of finished concrete.
5. Design of forms, shoring and bracing is the responsibility of the Contractor.

**B. Formwork Removal (ACI 301, Paragraph 4.5)**

1. Wall forms, pier forms, and similar vertical forms may be removed at such time that the concrete is sufficiently strong to not be injured by removal.
2. Forms shall be removed in such a manner as to insure the complete safety of the structure.

**3.03 PLACING REINFORCING**

**A. Reinforcing shall be held securely in place with suitable supports and ties sufficient to prevent displacement by placing of concrete. Reinforcing shall be positioned to a tolerance of plus or minus 1/4".**

**B. Clearance: (unless otherwise indicated)**

1. Footings and slabs on earth .....3"
2. All other surfaces .....1 1/2"

**C. Bars may be moved to avoid interference with other reinforcing steel, conduits or embedded items. If moved more than one bar diameter, consult with Owner to determine final placement.**

**D. Splicing**

1. Where splices occur, provide lap sufficient to develop full strength of bars. Stagger splices. Comply with splicing requirements of ACI 318.

**E. Provide anchor bolts, as shown on Drawings.**

**3.04 CONCRETE**

**A. General**

1. Thoroughly clean the areas in which concrete will be placed to ensure proper placement and bonding of concrete.

**B. Proportions and Consistency**

1. Use proportions of ingredients to produce proper placeability, durability, strength and other required properties.

2. Proportions shall produce a mixture that will readily Work into corners, angles of forms, and around reinforcement by methods of placement and consolidation employed on the Work, but without permitting materials to segregate or excessive free water to accumulate on the surface.
3. Measure and mix materials in accordance with ACI 318, ACI 304, and ASTM C 94.

C. Placement

1. Convey concrete from mixer to final position as rapidly as possible by methods that prevent loss or segregation of ingredients.
2. Consolidate all concrete by vibration so that the concrete is thoroughly worked around the reinforcement, around embedded items, and into corners of forms, eliminating all air or stone pockets which may cause honeycombing, pitting, or planes of weakness.

D. Conditions

1. Provide protection against environmental conditions that may adversely affect the quality of the concrete before, during, and after placement of the concrete and during the curing process.

E. Finishing

1. Exterior formed surfaces: "Smooth Form Finish"
  - a. Patch all tie rod holes and honeycombs immediately upon removal of forms.
2. Provide "Broom or Belt Finish" in transverse direction on all exterior slabs.
3. Finish sharp edges, expansion joints, etc., with a steel edging tool of 1/4" radius.

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**SECTION 15122  
PIPE SPECIALTIES**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Compressor system, inlet and outlet piping, and related equipment, and building with foundation
- B. Existing manholes modifications
- C. Gas/leachate wellhead assemblies

**1.02 RELATED SECTIONS**

- A. Section 02220 - Excavating, Backfilling, and Compacting
- B. Section 02684 - Horizontal Pipe Construction
- C. Section 02733 - Lift Station
- D. Section 03300 - Cast-In-Place Concrete
- E. Section 15162 - Leachate Well Pumps and Controls

**1.03 UNIT PRICE - MEASUREMENT AND PAYMENT**

**A. Basis of Measurement:**

- 1. Compressor system, including building and foundation, control system, inlet and outlet piping, and related equipment by lump sum
- 2. Existing manholes (two) modifications by lump sum
- 3. Wellheads (nine) by each

**4. Driplegs (two) by each**

**B. Basis of Payment:**

- 1. Compressor system and control station includes supplying and installing building and foundation, pipe, fittings, valves, dryers, filters, compressor, and related equipment and electrical controls.

- a. Building system shall house compressor system, controls, and related equipment.
  - b. Electrical service connections shall be included.
2. Existing manholes modifications include excavating, supplying pipe and fittings, connecting drainage from two existing liquids cutoff trench manholes to the leachate collection system gravity leachate flow, and backfilling.
3. Gas/leachate wellheads include removing and reusing vault structures that are currently in place, supplying and installing pipe, fittings, and valves (wellheads) to connect all extraction well pump discharges to the leachate gravity and pressure conveyance pipe including compressed air line connections.
4. Driplegs: Includes excavating, placing pipe bedding, yellow ribbon, installing 2 driplegs, compacting of backfill, and repair of the landfill cover.
5. Place and compact clay by cubic yard of compacted clay to a minimum depth of 2 ft below and around dripleg DL02 (if clay liner is compromised) and to the top of the existing clay liner as shown on Drawings for Dripleg DL02. A survey by a licensed surveyor, and the Engineer and Contractor shall determine the volume of compacted clay.

Backfill for dripleg DL01 shall be:

1-in. coarse aggregate meeting the following criteria:

<u>U.S. Sieve Size</u>	<u>Percent Passing</u>
1 in.	100%
3/4 in.	90-100%
3/8 in.	20-55%
No. 4	0-10%
No. 8	0-5%

#### 1.04 DEFINITIONS AND REFERENCES

- A. ASTM D1785 - Specifications for Rigid Poly Vinyl Chloride (PVC) Plastic Pipe. Schedules 40, 80, and 120.
- B. ASTM D2464 - Threaded Poly Vinyl Chloride (PVC) Plastic Pipe Fittings. Schedule 80.



- C. ASTM D2467 - Socket-type Poly Vinyl Chloride (PVC) Plastic Pipe Fittings. Schedule 80.
- D. ASTM D3350, PE 34543C - Polyethylene Plastic Pipe and Fittings Materials. HDPE Pipe and Fittings.
- E. ASTM D1248 PE 3408 - Polyethylene Plastic Moldings and Extrusion Materials. HDPE Pipe and Fittings.
- F. ASTM D3261 - Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- G. ASTM A53 - Standard Specifications for Steel, Black, and Hot-Dipped, Zinc-Coated Welded and Seamless Pipe.
- H. ANSI/AWWA - A21.50/C150 - Thickness Design of Ductile-Iron Pipe.
- I. ANSI/AWWA - A21.51/C151 - Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lines Molds for Water or Other Liquids.
- J. ANSI/AWWA - A21.10/C110 - Ductile-Iron and Gray-Iron Fittings 3-in. through 48-in. for Water and Other Liquids.

#### 1.05 SUBMITTALS

- A. Manufacturer's product literature, including but not limited to, dimensions, sizes, seals, and connections, pressure rating and installation instructions. Submittals shall be for, but not limited to, pipe supports, valves, labcock valves, temperature gauges, wellheads, sumps, and flame arresters.
- B. Submit documentation from a licensed master electrician which documents that the installed compressor, switches, controls, and seals all conform to state and national electrical codes.
- C. Operating and Maintenance instructions including, but not limited to: valves, temperature and pressure gauges, filters, dryers, sumps, wellheads, and flame arresters.

#### 1.06 QUALITY ASSURANCE

- A. All pipe, fittings, valves and related equipment shall be new and unused.
- B. Each length of pipe shall be clearly marked with Manufacturer's name, the type and class of pipe.

- C. A guarantee of one year after acceptance by Owner of all equipment, materials, and workmanship to be free from defect and that the system will operate without excessive noise, vibration, or uncontrolled expansion.
- D. Replacement or repair shall be at no cost to Owner.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. Compressor system and control station equipment

1. Equipment shall be a pre-engineered, factory tested package, air compressor system capable of operating the designed leachate collection system with 50% extra capacity. The system supplier shall be QED, or equal approved by the Engineer with the following features:
  - a. Size compressor to handle 14 wells total (including lift station pump).
  - b. Dryers and filters to maintain dry pump supply air to reduce freezing problems.
  - c. Controls based on logic described below.
  - d. Piping shall enter compressor building through the slab foundation with pipe sleeves as appropriate.
  - e. Building vents shall be installed towards the top of building, where possible, to reduce risk of vandalism, or animal damage.
2. Condensate from compressor dewatering system shall be drained by gravity to the holding tank and connected to the vent pipe riser. Conveyance pipe size and material shall be as specified by the compressor system supplier and approved by the Engineer.
3. The LCS control and compressor building shall be supplied as pre-assembled and tested by the manufacturer/supplier and the building shall be a Trachte steel channel frame design with the following features, or approved alternates:
  - a. A suitable concrete foundation system
  - b. Standard "Trachte Remediation Building" features
  - c. A skid-system base for building to allow portability
  - d. Heat, lights, double-door, insulation
  - e. 2-Hr fire rated

- f. Hooded air intakes
  - g. Insulated steel floor
  - h. Building size is 10 ft x 16 ft x 8 ft-4 in. high
  - i. Standard exterior steel siding; color to be Tudor Brown.
4. The electrical and control system for the complete leachate collection system will be included within the Trachte building based on the following logic and controls:
- a. The buried leachate holding tank has two floats (first high-level and second high-level). The first high-level will trip at 7,500 (75%) of the tank's capacity and will not shut down leachate extraction system pumps or lift station pumping. The second high-level will trip at 9,000 (90%) of the tank's capacity and will shut down extraction well and lift station pumps. A white light shall be illuminated on the exterior of the compressor station building signifying any high-level tank condition; light shall be visible from a vehicle.
  - b. An 8-channel (discrete inputs) telephone telemetry system shall be included to notify operating personnel of the following conditions:
    - 1) Power failure
    - 2) Buried leachate tank first high-level alarm
    - 3) Buried leachate tank second high-level alarm
    - 4) Tank interstitial wall moisture
    - 5) Compressor shutdowns
- The telemetry system will use one standard phone service line. A second line shall be supplied with a cordless telephone/answering machine combination installed.
- c. Power available for the compressor and control station is: 3 phase, 4 wire, 120/208 volts service. Controls shall be 110 volt or, as appropriate.

#### B. Gas/Leachate Wellheads

- 1. Wellheads shall be capable of:
  - a. Attaching to the 6-in. Sch. 120 PVC extraction well.
  - b. Measuring gas composition and pressure (include 1/4-in. PVC labcock valve).
  - c. Attaching to the 6-in. dia HDPE leachate gravity conveyance pipe riser
  - d. Attaching to the 6-in. dia HDPE gas header pipe riser (future)
  - e. Preventing gas from entering leachate discharge at wellhead

- f. Handling QED pneumatic leachate pumps and controllers, in the vault structure, or approved equivalent by Engineer.
- g. Utilizing side-flanged pipe and hose connections as shown on Drawings.

## 2.02 PIPE BEDDING MATERIAL

- A. Pipe bedding material as specified in Section 02220 - Excavating, Backfilling, and Compacting, and Section 02684 - Horizontal Pipe Construction.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Engineer shall document that pipes, compressor and control station are suitable for installation of the pipe specialties.

### 3.02 INSTALLATION

- A. Install pipe and related equipment to the compressor and control station after the construction has been approved by the Engineer .
- B. Construct trenches according to Section 02684 - Horizontal Pipe Construction and Section 02220 - Excavating, Backfilling and Compacting.
- C. Contractor shall install wellheads in accordance with the Drawings and per manufacturer's recommendations. The wellheads shall be installed after installation of the header pipe system.

### 3.03 TOLERANCES

- A. Pipe inverts shall be installed to a tolerance of plus or minus 0.10 ft.

### 3.04 FIELD QUALITY CONTROL

- A. Engineer may collect samples of pipe bedding for laboratory testing.
- B. Engineer shall document pipe inverts at appropriate locations.

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**SECTION 15162**  
**LEACHATE WELL PUMPS AND CONTROLS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Supplying and installing leachate well pumps, controls, and associated electrical control equipment

**1.02 RELATED SECTIONS**

- A. Section 15122 - Pipe Specialties

**1.03 UNIT PRICE - MEASUREMENT AND PAYMENT**

- A. Basis of Measurement: Each set of well pumps, controllers, and controls by units of each.
- B. Basis of Payment: Supply and install nine sets of well pumps, controllers, controls, and associated electrical control equipment.

**1.04 SUBMITTALS**

- A. Manufacturer's product literature
- B. Operation and Maintenance instructions

**1.05 QUALITY ASSURANCE**

- A. Quality assurance shall be as approved by Engineer.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

**A. Leachate Well Pumps**

1. The well pump unit shall be a pneumatic submersible pump with controller and controls as manufactured by QED Model Solo II or approved equal by Engineer based on leachate quality data and extraction well design.

2. The pumps shall be 2 ft long with a leachate screen and capable of 1 to 3 gpm.
3. The controller/control system shall include a bubbler line with an environmental controller enclosure with filter, regulator, magnehelic pressure gauge, and cycle counter on air line.
4. Excess compressor/pump air shall be discharged to the atmosphere, not into the wells. The wellhead vault must be vented to the atmosphere.

#### B. Well Pump Controls

1. Contractor shall provide and install all power and control interconnections for proposed leachate extraction pump control system.
2. Power to the leachate extraction well pumps shall be controlled by the landfill alarm monitoring system. Extraction well pump operation shall be terminated in the event of the second high-level alarm at the buried leachate holding tank.
3. All electrical control connections shall include hazardous area conduit seal-offs.
4. The well pump cycles shall be counted at each wellhead and the lift station and the signal transmitted to the compressor/control building where monitoring personnel shall be able to view each well's and the lift station's performance.

#### C. Pump Volume Monitoring

1. The transmitted cycle counts from the wellheads and lift station shall be received at the compressor/control building.
2. Equipment shall be provided that will allow operating personnel with the ability to determine totalized cycle counts for all wells and lift station at any time.

### PART 3 - EXECUTION

#### 3.01 INSTALLATION

- A. Install pumps in each of the nine extraction wells, to the bottom of well pipes allowing for filling of bottom inlet, per manufacturers' instructions, and as directed by the pump supplier and Engineer.

### 3.03 SYSTEM TESTING

- A. The performance of the submersible leachate extraction well pumps shall be demonstrated after installation in the wells.

### 3.04 FIELD QUALITY CONTROL

- A. Engineer shall document installation of pumps, controllers, controls, and electrical.

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**SECTION 15177**  
**UNDERGROUND LEACHATE HOLDING TANK**

**PART 1 - GENERAL**

**1.01 WORK INCLUDES**

- A. Underground leachate holding tank, load-out facility, and related piping and controls, including integrity inspection and testing.

**1.02 RELATED SECTIONS**

- A. Section 02222 - Excavating, Backfilling, and Compacting
- B. Section 02684 - Horizontal Pipe Construction
- C. Section 03300 - Cast-In-Place Concrete

**1.03 UNIT PRICE**

- A. Basis of Measurement: Underground leachate holding tank by lump sum.
- B. Basis of Payment: Supply and install tank, floats, pipe connections, loadout station with pipes, controls, and other related appurtenances including, hold-down equipment, excavation and backfill, and integrity testing.

**1.04 SUBMITTALS**

- A. Manufacturers' written product literature, including but not limited to, dimensions, sizes, seals and connections, and installation instructions. Submittals shall be for, but not limited to, underground holding tank, tank level floats, and interstitial monitoring systems.

**1.05 QUALITY ASSURANCE**

- A. All pipe fittings shall be new and unused.
- B. Each length of pipe shall be clearly marked with the manufacturers' names, types and classes of pipes.



## PART 2 - PRODUCTS

### 2.01 MATERIALS

#### A. Underground Holding Tank

1. Underground holding tank shall be a 10,000 gal underground double-walled steel tank (STI P3) by Lannon, APS, or approved equal by Engineer and shall include the following features:
  - a. Cathodic protection system
  - b. Monitoring riser for interstitial monitoring with moisture probe
  - c. Two high-level tank floats and access riser
  - d. Gravity leachate pipe inlet
  - e. Leachate loadout pipe
  - f. Entrance for condensate discharge from compressor system
  - g. Entrance for tank volume stick/sampling riser
  - h. All pipe entrances shall be flanged connections with viton gaskets
2. Tank shall have been pressure tested by manufacturer, per manufacturer's guidelines, prior to delivery to the site.
3. Tank may include an STI-86 accessway to facilitate pipe connections if approved by Engineer.
4. The interstitial tank sensor shall be a liquids discrimination sensor such as the Red Jacket Sensor No. 400-067-5, or as approved by the Engineer. Sensor riser shall be 2-in. Sch. 80 PVC pipe with access to float provided at surface using all air-tight connections for surface pipe and electrical fittings. Sensor must be accompanied by suitable control equipment and interfaced with control logic of leachate collection system as defined in Section 15122 - Pipe Specialties (2.01A).
5. The electrical and control system for the complete leachate collection system shall be included with the Trachte building based on the logic and controls in Section 15122.

- a. Power available for the compressor and control station is: 3 phase, 4 wire 120/208 volts service.

### PART 3 - EXECUTION

#### 3.01 CONSTRUCTION TOLERANCES

##### A. Horizontal

1. The condensate collection system shall be installed to a tolerance of  $\pm 1.0$  ft from that shown on the Drawings.

##### B. Vertical

1. The condensate collection system shall be installed to a tolerance of  $\pm 0.5$  ft from that shown on the Drawings.

#### 3.02 CONSTRUCTION

- A. Install holding tank and appurtenances at locations and elevations shown on Drawings.

- B. Excavation for holding tank shall occur according to Section 02220 - Excavating, Backfilling and Compacting. Backfill shall be:

1-in. coarse aggregate meeting the following criteria:

<u>U.S. Sieve Size</u>	<u>Percent Passing</u>
1 in.	100%
3/4 in.	90-100%
3/8 in.	20-55%
No. 4	0-10%
No. 8	0-5%

- C. Tank level indicators and interstitial monitoring service shall be installed according to the manufacturer's written instructions and shall operate to achieve the system control and logic described per Section 15122 - Pipe Specialties.

- D. Tank installation shall include concrete deadweights as shown on the Drawings and in accordance with Section 03300 - Cast-In-Place concrete. Hold down straps shall be capable of holding against calculated buoyant forces of 84,000 lb. Straps and hardware shall be steel, with corrosion coating, and shall be isolated from the tank, or approved equal by Engineer.

E. Loadout basin shall be as shown on Drawings.

F. The holding tank shall be pressure tested after installation and prior to excavation backfill to verify integrity of tank and pipe connections. Test must include condensate conveyance pipe from dripleg DL02 which carries the condensate to the tank.

The tank and the interstice shall be tested separately and shown to hold 5 psi for a minimum of 1 hour without losses.

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## SECTION 16000 ELECTRICAL REQUIREMENTS

### PART 1 - GENERAL

#### 1.01 SERVICE ENTRANCE

The electrical service to the leachate collection system shall be made at the location of the compressor/control building. The exact location will be provided by the Forest Preserve District or the Engineer. Commonwealth Edison, the local utility, will provide the electrical service of 3-phase, 4 wire, 120/208 volts including the main transformer and wiring to the transformer. The Contractor is responsible for supplying the concrete pad for the transformer following Commonwealth Edison specifications. The utility contact is Ms. Diane Bowen at (630) 691-4393. The utility will also provide the metering, however, the Contractor shall supply and install the metering fittings and all wiring from the transformer to power and control all leachate collection system components.

#### 1.02 GENERAL

- A. Provide all equipment, materials, labor and services to furnish, install and connect the various components of the Work, as required by these Specifications and as shown on the Drawings, including all incidental items necessary to complete the project in every respect.
- B. Provide electrical equipment and materials which conform to the applicable standards of the National Electrical Manufacturers Association (NEMA), the American National Standards Institute (ANSI), and are listed or labeled by Underwriters Laboratories (UL) or other approved agency.
- C. Provide equipment and materials from the manufacturers specified. Substitute products from other manufacturers only with prior approval from the Engineer.
- D. Install equipment and materials in compliance with the latest editions of the National Electrical Code (NEC) and the National Fire Protection Association's, Life Safety Code (NFPA-101).
- E. Submit for approval at least four (4) copies of shop drawings for equipment, including, but not limited to, the following:
  - TRANSFORMERS
  - DISTRIBUTION PANELS
  - LIGHTING PANELS
  - RECEPTACLE PANELS
  - MOTOR CONTROL CENTERS
  - MOTOR STARTERS
  - DIMMER FIXTURES
  - TIMER SWITCHES
  - CAPACITORS
  - CABLE TRAYS
  - MEDIUM VOLTAGE CABLES
  - TERMINATION AND SPLICE KITS

- |                                 |                          |
|---------------------------------|--------------------------|
| - CONTACTORS                    | - FIRE ALARM SYSTEMS     |
| - DISCONNECT SWITCHES           | - CLOCK SYSTEMS          |
| - VARIABLE SPEED DRIVES         | - SECURITY SYSTEMS       |
| - LARGE MOTORS (ABOVE 40 HP)    | - INTERCOM SYSTEMS       |
| - FEEDER BUS DUCT               | - PUBLIC ADDRESS SYSTEMS |
| - PLUG-IN BUS DUCT              | - CCTV SYSTEMS           |
| - WIRING DEVICES                | - SOUND SYSTEMS          |
| - FLEXIBLE MANUFACTURED WIRING  | - MISC. CONTROL SYSTEMS  |
| - ELECTRICAL NONMETALLIC TUBING | - MISC. CONTROL PANELS   |
| - LIGHTING FIXTURES             | - THERMOSTATS            |

- F. Provide, maintain and remove all temporary lighting and power required for the completion of the Work.
- G. Carefully remove and clean items designated for relocation, and store for reuse. Legally dispose of all removed items which are not being re-used.
- H. Coordinate all power interruptions with Engineer or Owner to minimize inconvenience to the Owner activities. Maintain power to all loads outside of the Work area.
- I. Install and connect new Work to existing Work neatly and carefully. Existing Work that is disturbed shall be replaced or repaired as necessary to restore it to its prior condition.
- J. Coordinate Work with the other trades to assure working space around electrical equipment is in accordance with the NEC.
- K. Coordinate Work with the other trades to provide access to equipment requiring maintenance. Provide access doors to all maintainable equipment located behind walls or above permanent ceilings.
- L. Should field conditions prevent the installation of equipment or materials as indicated on the Drawings, deviations shall only be made with the prior approval of the Engineer.
- M. Submit, to Engineer, marked up, "as built" or record Drawings showing actual locations of all equipment, light fixtures, switches, receptacles and junction boxes, the sizes and conductor information for conduits, circuit numbers, risers and all deviations from the design. Dimension the locations of buried, embedded, and concealed primary and feeder circuit conduits from a permanent building feature such as a column, beam, etc.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. Lighting and receptacle panels shall be based on 200 amp service, 3 phase, 4 wire, 120/208 volts with at least 22,000 (verify with local utility) amps AIC-rated, circuit breaker type, with main circuit breaker 30 minimum positions (based on need), copper bus, fully rated neutral and ground bar, NEMA 1 enclosure and surface trim. Provide circuit breakers as shown. Allen-Bradley, Eaton/Cutler Hammer, GE, Siemens, Square D, or Westinghouse.
- B. Combination starters shall be 250 volts, 3 pole, NEMA size (based on motor sizes), fusible disconnect switch type, with "hand-off-auto" selector switch, red "run" pilot light, 120 volt fused control transformer, 2 N.O. and 2 N.C. auxiliary contacts, and a NEMA type 1 enclosure. Provide Class R dual element fuses and overload heaters sized in accordance with the motor nameplate. Allen-Bradley, Eaton/Cutler Hammer, GE, Siemens, Square D or Westinghouse.
- C. Disconnect switches shall be 250 volts, amps (based on motor sizes), 3 pole, heavy duty, fusible type in a NEMA-1 (indoor) enclosure. Provide Class R dual element fuses as shown. Allen-Bradley, Eaton/Cutler Hammer, GE, Siemens, Square D or Westinghouse.
- D. Toggle switches shall be 120/277 volts, 20 amps, single pole, double pole, 3-way or 4-way as shown, specification grade, extra-heavy duty, with ivory [brown, white] handles. Arrow Hart, Bryant, Hubbell, Pass & Seymour.
- E. Dimmer switches shall be rated 600 [1000] watts minimum, specification grade, heavy duty, with radio noise filter and suitable for use in a single gang box. Leviton, Lithania or Lutron.
- F. Duplex receptacles shall be 125 volt, 20 amp, 2 pole, 3 wire, specification grade, extra-heavy duty grounding type with nylon or lexan bodies and ivory faces. Bryant, Hubbell or Pass & Seymour No. 5362.
- G. GFI duplex receptacles shall be rated 125 volts, 20 amps, 2 pole, 3 wire straight blade type. GFI receptacles shall trip when ground currents exceed 5 MA, shall trip in 25 milliseconds, and shall have an interrupting rating of 2,000 amps. Bryant, Hubbell or Pass & Seymour.
- H. Cover plates for switches and receptacles shall be high quality stainless steel.
- I. Provide lighting fixtures and lamps as shown on Drawings.
- J. Conduits indoors through 4 in. diameter shall be EMT with steel set screw fittings. Conduits outdoors, conduits indoors over 4 in., conduits for primary distribution, and conduits for fire pump feeders shall be rigid steel or intermediate metal conduit with cast or malleable iron threaded fittings. Fire

pump feeder conduits shall be encased in 2 in. of concrete (or an equivalent 1 hour fire resistance) in accordance with NFPA-20.

- K. Drops to recessed lighting fixtures may be flexible metallic conduit or flexible manufactured wiring. Electrical nonmetallic tubing may also be used, but only where accessible and where permitted by code.
- L. Connections to motors, vibrating equipment, or equipment removed for routine maintenance shall be made with liquid tight flexible metallic conduit and liquid tight fittings.
- M. Surface raceways shall be UL approved, PVC-coated rigid pipe and sized for the number of conductors contained within. PVC pipe can be used for control wires in trenches. Barriers shall be provided when necessary to separate conductors of different voltages or services. Airey-Thompson, Isoduct, Walker or Wiremold.
- N. Wire and cable shall be single conductor copper, with type THHN insulation rated 90°C, 600 volts. Minimum wire shall be No. 12 AWG (American Wire Gauge), except for control and alarm system wiring, which may be smaller. Wire, No. 12 AWG and larger, shall be stranded. Anixter, Brand-Rex, Carol, Rome, Southwire or Triangle.
- O. Connectors for splicing power cables shall be of the solderless compression type. Connectors for splicing branch circuit wiring, lighting wiring, and control and instrumentation wiring shall be of the solderless wire nut type. Lugs for terminating power cables shall be of the solderless compression ring type. Lugs for terminating control and instrumentation wiring shall be of the solderless compression ring or spade type. Compression terminations shall be crimped with tools designed for the terminations being crimped.
- P. Nameplates shall be engraved lamicoid with dark letters on a light background, and letters at least 1/4 in. high. Self-adhesive plastic type labels are not acceptable.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Install equipment in accordance with manufacturers' instructions.
- B. Support all electrical items independently of supports provided by the other trades.

- C. Support recessed lighting fixtures independently of the ceiling grid system using two safety wires minimum on diagonally opposite corners of the fixtures.
- D. Support raceways and boxes using 1/4 in. minimum diameter threaded rod hangers. Suspended ceiling hangers or hanger wire shall not be used.
- E. Route and independently support flexible metallic conduit, electrical nonmetallic tubing, and flexible manufactured wiring in a neat and workmanlike manner, and secure at intervals not exceeding 3 ft.
- F. Provide a nameplate indicating the equipment name or number where shown on Drawings, and its power source, for the following equipment:
 

- Transformers	- Dimmer Fixtures
- Distribution Panels	- Timer Switches
- Lighting Panels	- Capacitors
- Receptacle Panels	- Cable Trays
- Motor Control Centers	- Medium Voltage Cables
- Motor Starters	- Termination and Splice Kits
- Contactors	- Fire Alarm Systems
- Disconnect Switches	- Clock Systems
- Variable Speed Drives	- Security Systems
- Large Motors (above 40 hp)	- Intercom Systems
- Feeder Bus Duct	- Public Address Systems
- Plug-in Bus Duct	- CCTV Systems
- Wiring Devices	- Sound Systems
- Flexible Manufactured Wiring	- Misc. Control Systems
- Electrical Nonmetallic Tubing	- Misc. Control Panels
- Lighting Fixtures	- Thermostats
- G. Provide a typed directory for all new and modified panelboards.
- H. Mark junction box covers with the panel and breaker numbers of the circuits contained within.
- I. Size conduits in accordance with the NEC, but not less than the sizes shown on the Drawings. Minimum conduit size shall be 3/4 in. diameter (except for individual switch drops and lighting fixture drops, which may be 1/2 in. diameter).
- J. Install conduits parallel or at right angles to building lines.
- K. Make changes in primary distribution conduit direction aboveground with sweeps and long radius elbows, and underground with 10 in. minimum radius bends.
- L. Conceal conduits wherever possible and practical. When conduits cannot be concealed in finished areas, use surface raceways with matching boxes of the same manufacture as the raceways.



- M. Provide sleeves for all conduits penetrating floors. Sleeves shall extend above the floor a minimum of 2 in., and shall either be embedded in the concrete or sealed to the concrete with epoxy grout.
- N. Seal floor sleeves and penetrations in fire-rated walls as required to maintain the fire ratings.
- O. Provide an individual feed from a junction box to each lighting fixture. Lighting fixtures shall not be daisy-chained.
- P. Provide a separate neutral conductor back to the panel neutral bar for each single phase branch circuit. Neutrals of single phase circuits shall not be shared or daisy-chained.
- Q. Provide a separate green grounding conductor for each branch circuit to devices, fixtures and outlet boxes from the panel ground. Grounds shall not be shared or daisy-chained. Raceways shall not be used as grounding conductors.
- R. Phase new installations X-Y-Z (or A-B-C) from top to bottom, front to back, and left to right when viewed from the front. Phase existing installations to match the existing.
- S. If no color coding system exists, color code circuits as follows:

<u>Phase</u>	<u>X(A)</u>	<u>Y(B)</u>	<u>Z(C)</u>	<u>Neutral</u>	<u>Ground</u>
Above 600 Volts	Black	Red	Blue	--	--
480/277 Volts	Brown	Orange	Yellow	Grey*	Green
208/120 Volts	Black	Red	Blue	White*	Green
240/120 Volts	Black	Red	--	White*	Green
Less than 120 Volts - use industry standard methods					

Note: When neutrals from two different systems or voltage levels are routed through the same raceway or box, the neutrals from one set shall be color coded with a colored stripe.

- T. Color code disconnect switches, junction box covers, etc., of emergency circuits with red paint for easy identification.
- U. In general, install equipment and devices at the following heights:

<u>Mounting Height</u> <u>Device</u>	<u>(Except as Otherwise Noted)</u>
Receptacles (wall)	18" A.F.F.** to center
Receptacles (above counter)	48" A.F.F. to center
Receptacles (unfinished area)	48" A.F.F. to center
Receptacle strips	42" A.F.F. to bottom
Light switches	48" A.F.F. to center
Telephone outlets (wall phone)	54" A.F.F. to center

Telephone outlets (desk phone)	18" A.F.F. to center
Clock outlets	88" A.F.F. to center
Fire alarm pull stations	48" A.F.F. to center
Fire alarm horn/strobes	88" A.F.F. to center
Electrical panels	72" A.F.F. to top
Safety switches/motor starters	72" A.F.F. to top**
Motor control pushbuttons	60" A.F.F. to center

Note: \*A.F.F. (Above Finished Floor)

\*\*Highest point on handles shall not exceed 78" A.F.F.

- V. Provide ground fault circuit interrupter protection for all 120 volt duplex receptacle outlets located outdoors, in toilet areas, and within 6 ft of sinks, cup sinks, and lavatories.

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## **SECTION 16900 INSTRUMENTATION AND CONTROL SYSTEMS**

### **PART 1 - GENERAL**

#### **1.01 DESCRIPTION OF SYSTEMS**

- A. Lift Station pump and controls as stated in Section 02733.
- B. Compressor system as stated in Section 15122.
- C. Leachate well pumps, controllers, and controls as stated in Section 15160.
- D. Underground leachate tank as stated in Section 15177.
- E. Furnish all labor, materials, equipment, technical supervision, and incidental services required to complete, test, and leave ready for operation the electrical and control system as indicated on the Drawings and Specifications.

#### **1.02 STANDARD OF QUALITY CONTROL**

- A. Throughout the Specifications, types of materials may be specified by manufacturer's name and catalog number in order to establish standards of quality and performance and not for the purpose of limiting competition. Unless specifically stated otherwise, the Contractor may assume the phrase "or other approved" is inferred, except that the burden is upon the Contractor to prove equality with specified items. If the Contractor elects to prove such equality, he must request the Engineer's and the Owner's approval, in writing, prior to substituting for the specified item. The Contractor shall state the cost difference involved, with supporting data, and samples if required, to permit a fair evaluation of the proposed substitute with respect to quality, serviceability, warranty, and cost.

#### **1.03 SOURCE QUALITY CONTROL**

- A. Furnish equipment and materials indicated on the Drawings and in the Specifications conforming to Equipment Publications and Underwriters' Laboratories, Inc., and National Electrical code.
- B. All equipment and materials indicated on the Drawings and in the Specifications shall bear the UL label.
- C. Furnish wire and cable on which standard factory tests established by ASTM, ANSI, and NEMA have been performed.

#### 1.04 FIELD QUALITY CONTROL

- A. Install equipment and material in compliance with the regulations of local, state, or federal governmental laws governing electrical installation, the latest edition of the National Electrical Code, and the requirements of the Drawings and Specifications.

#### 1.05 SUBMITTALS

- A. Submit four (4) sets of shop Drawings for items listed herein. Include complete data on each item. Coordinate the items, as they relate to the Work, prior to submittal. Shop Drawings shall include:

1. Fuses
2. Control Transformers
3. Control Relays
4. Timers
5. Disconnect Switches
6. Pushbutton Switches
7. Pilot Lights
8. Selector Switches
9. Conduit
10. Wiring

#### 1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

##### A. Wire and Cable Delivery

1. Deliver all wire and cable to the site on reels or in coils, plainly marked for complete identification, including the wire or cable size, the number of conductors, type of wire or cable, length, weight, thickness and character of the insulation, and the name of the manufacturer. Furnish [300] volt wires for instrumentation cables on coils and reels carrying original date-perforated inspection labels of the Underwriters' Laboratories showing the number of feet and type of wire contained.  
DO NOT MIX WITH POWER WIRES.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS

##### A. Conduit, Conduit Fittings, Outlet Boxes, and Pull and Junction Boxes

1. Provide as specified

## 2.02 WIRE AND CABLE

A. Provide as specified

B. Multiconductor instrumentation cables: Copper, not less than No. 18 AWG. Furnish conductor sizes as indicated. For two conductor, provide 2-conductor twisted with 100% shield and drain wire. If multiconductor cables are proposed, provide twisted pairs with shield and drain wire with minimum 10% spares. Manufacturer:

1. Beldon Cable Co.
2. Alpha Cable Co.
3. Other approved.

## 2.03 CONTROL DEVICES

A. Push Buttons and Selector Switches: Heavy duty, oil-tight type, with contacts, 10 amperes continuous, [300] volts AC, with legend plate and operation as indicated. Manufacturer:

1. Allen-Bradley Bulletin 800T
2. General Electric CR2940

B. Indicating Lights: Heavy duty, oil-tight type with 6 volt lamp, integral 120-6 volt transformer, push-to-test feature, color cap and legend plate as indicated. Manufacturer:

1. Allen-Bradley Bulletin 800T
2. General Electric CR2940
3. Square D Class 9001, Type K

C. Control Relays: Heavy duty industrial type with convertible contacts rated 10 amperes continuous, 300 volts AC. Provide coils for operation on 120 volts AC unless other requirements are indicated. Provide number and type of contacts as indicated. Where interposing relays are provided as part of the direct digital controller, manufacturer's standard relay model is acceptable. Manufacturer:

1. Allen-Bradley Bulletin 700, Type P
2. Square D Class 8501, Type G

D. Control Relays: Miniature, plug-in, rated 3A, 120V AC, provide coils for operation on 120V AC unless other requirements are indicated. Provide number and type of contacts as indicated. Manufacturer:

1. Westinghouse Type MC

2. Square D Class 8501, Type R
  3. Potter Brumfield KHAV Series
- E. Enclosures: NEMA, 1, 12, 4, and 4X outdoor and wet location enclosures shall be NEMA 4. In corrosive areas use NEMA 4X.
- F. Limit Switches: Oil-tight type with operator to provide required function. Manufacturer:
1. Allen-Bradley
  2. General Electric
  3. Square D
  4. Westinghouse
- G. Control Transformers: 120/240V AC as required, size as indicated, complete with fuses. Mount in NEMA 1 enclosure. Manufacturer:
1. Allen-Bradley
  2. Square D
  3. Other approved
- H. Terminal Blocks: 300 volt class terminals with wire clamps. Manufacturer:
1. Allen-Bradley Bulletin 1492
  2. Buchanan
  3. Other approved

## 2.04 GROUNDING

- A. Insulated Grounding Conductors: stranded annealed copper insulated with a heat and moisture resistant polyvinyl chloride compound and meeting UL Requirements for Type THW, 75 deg C, rated 600 volts, color-coded green. Conductor No. 10 AWG and smaller may be solid in lieu of stranded.

## 2.05 GROUNDING CONNECTIONS

- A. Exothermic Welding Connection Materials. Manufacturer:
1. Cadweld
  2. Other approved

## 2.06 WIRING DEVICES

- A. Ground Fault Circuit Interrupter (GFI) Receptacle: 120 VAC, 15/10 amp., feed through, Class A. Manufacturer:

1. Arrow-Hart GF 5242
2. General Electric CTR Series
3. Gould/ITE GFIR Series
4. Pass and Seymour 1591-F Series

## 2.07 LIGHTING FIXTURE

A. 150 watt weather proof fixture.

B. Manufacturer:

1. Daybright
2. Westinghouse
3. Other approved

## PART 3 - EXECUTION

### 3.01 CONDUIT MATERIAL INSTALLATION

A. Conduit and fittings between field-mounted equipment and wall or building-mounted pull boxes shall be rigid. Home runs between local pull boxes, wall-mounted panels and/or pull boxes may be EMT conduit.

### 3.02 WIRE AND CABLE INSTALLATION

A. Splicing of instrumentation cable is not allowed. Where required because of length of runs, Contractor shall use approved terminal boxes.

### 3.03 DISTRIBUTION EQUIPMENT SUPPORTS AND IDENTIFICATION

A. Anchor all self-supporting equipment securely to floors and to supporting steel where such supports are required.

B. Provide identification on all control panels:

1. On surfaces 4 in. by 4 in. and greater, hand paint or stencil with bright yellow paint, or provide good quality decal, with bright yellow letters.

### 3.04 GROUNDING

A. Where insulated conductors are used, thoroughly tape all exposed connections.

B. Carry an equipment ground wire with all branch circuit conductors.

- C. Where metallic conduit is used for mechanical protection of a ground conductor, bond conductor to the conduit at each end.

### 3.05 ELECTRICAL ACCEPTANCE TESTS

#### A. Description of Systems

1. Preliminary inspections and tests: Visual inspections of electrical equipment, wire checks of factory wiring, and any other preliminary Work required to prevent delays during performance of electrical acceptance tests.
2. Electrical acceptance tests: Those inspections and tests required to show that the workmanship, methods, inspections, and materials used in erection and installation of the electrical equipment conforms to accepted Engineering practices as per the IEEE Standards, IPCEA-NEMA Standards, the National Electrical Code, manufacturer's instructions, and this Section, and to determine that the equipment involved may be energized for operating tests.
3. Operating tests: Those tests performed on all electrical equipment installed under this Section, and under other Sections, to show that the electrical equipment will perform the functions for which it was designed.
4. Furnish all labor, materials, test equipment, and technical supervision to perform and record the electrical tests as specified, and perform and record all electrical tests as required, including tests on 600 volt wire and cable and control devices, unless otherwise specified.

#### B. Related Work Specified in Other Sections

1. Operating tests on mechanical and electrical equipment installed under other Sections of these Specifications to prove capability of such equipment to perform as specified.

### 3.06 FINAL ACCEPTANCE

- A. Final acceptance of electrical equipment will not only depend on equipment integrity as determined by the electrical acceptance tests, but will also depend on complete operational tests, whether performed under this or other Sections.

### 3.07 TEST REPORT SUBMITTALS

- A. Submit test reports, including complete data on actual readings taken and corrected values, to the Engineer for approval after each test period. Prior to submission, have all test reports signed by authorized witnesses. Do not energize



any equipment or material for full-time operation tests until test data has been approved.

- B. Submit two copies of final approved test reports to the Owner, through Engineer, at the completion of the Work under this Section.

### 3.08 ENVIRONMENTAL REQUIREMENTS

#### A. Humidity

- 1. Do not perform megger tests during times of high relative humidity.

### 3.09 SCHEDULING OF TESTS

#### A. Perform all acceptance and operating tests in the presence of the Engineer.

- B. Schedule sequence of tests so that equipment can be energized immediately after completion of the applicable tests and approval of test reports. Notify the Engineer of time of test at least 48 hours prior to testing.

- C. Notify vendors and manufacturers of electrical equipment of the time of tests and extend reasonable cooperation to them or their representatives to permit them to witness tests should they so request. Obtain list of manufacturers of Owner-prepurchased equipment from the Engineer.

### 3.10 GENERAL TESTING REQUIREMENTS

#### A. Preliminary Work

- 1. Perform preliminary inspections and tests immediately prior to performing acceptance tests. Fuses and fusing devices, such as cable limiters, shall be omitted from cable tests and tests involving cables.

#### B. Megger Tests

- 1. Megger readings specified are the minimum readings desired at an ambient temperature of 60 deg F (15.56 deg C) and at a low relative humidity. When megger readings are taken at other than 60 deg F, convert readings to equivalent values at 60 deg F.
- 2. When megger readings fall below the specified minimum values at 60 deg F, devise some means of applying heat for the purpose of drying out the equipment, subject to the approval of the Engineer. If drying is to be done by applying an electrical potential to a piece of equipment, do not exceed the

continuous voltage or current ratings for the equipment which is to be dried, either directly or by induction.

#### C. Continuity Tests

1. Perform continuity tests with a DC type device using a bell or buzzer. Do not use phones for continuity tests, use phones only for communication.

### 3.11 TESTS ON CONTROL WIRING

#### A. General

1. Give each single conductor and multiconductor control wire or cable a continuity test and an insulation strength test. Verify identification of conductors.

#### B. Connections

1. Disconnect and fan out conductors to be tested.

#### C. Insulation Strength Tests

1. Subject each control wire to a [1000 volt, 60 hertz test].
2. Apply test between each conductor in a wire group and ground with all other conductors in the wire group grounded to the same ground. Use a test set having an accurate means of insuring 1000 volt test voltage and provide a series resistance to limit fault when a ground is found. Hold test voltage only long enough to read instruments. Test each conductor in the same manner.
3. In lieu of the above insulation strength test, megger each control wire as specified for [480] volt power conductors.

#### D. Acceptance

1. Wires must pass all tests.

#### E. Records

1. Include the following information in test report on each wire group.
  - a. Wire and group identification
  - b. Type of test, insulation strength or megger

- c. When megger testing is selected, include information as specified for [480] volt power cables.

### 3.12 TESTS ON CONTROL DEVICES

#### A. General

1. Perform operating tests on all control or indicating devices installed under this Section.

#### B. Connections

1. Include motors and protective control devices in test circuitry where operation of motors will not damage attached equipment.
2. Where equipment could be damaged by energizing motors, disconnect motor leads at the load side of starters.
3. Jumper or disconnect, as applicable, control devices installed under other Contracts to permit testing those devices and circuitry installed under this Section.
4. Coordinate these connections and tests with the Contractor responsible for the installation of motors.

#### C. Acceptance

1. Control devices and circuitry must pass all tests to prove that all operating functions are satisfactorily performed, including manual and automatic operation and interlocking.

#### D. Records

1. Make complete records of all tests and submit two (2) copies to Engineer.

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**SITE SAFETY PLAN - ADDENDUM No. 1**

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**ADDENDUM NO. 1  
SITE SAFETY PLAN  
LANDFILL CAP REPAIRS**

**FOR THE**

**BLACKWELL LANDFILL  
DUPAGE COUNTY, ILLINOIS**

**Montgomery Watson File No. 1252008**

**Prepared For:**

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**DuPage County Forest Preserve District  
DuPage County, Illinois**

**Prepared By:**

**Montgomery Watson  
2100 Corporate Drive  
Addison, Illinois 60101**

**June 1997**



**MONTGOMERY WATSON**

# **ADDENDUM NO. 1**

## **SITE SAFETY PLAN**

### **SITE SAFETY PLAN (SSP) REVIEW SIGNATURES**

Health and Safety: \_\_\_\_\_

Date: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Date: \_\_\_\_\_

### **KEY PERSONNEL**

Site Manager: Walter Buettner  
Alternate: Peter Vagt

Site Safety Officer: To Be Determined  
Alternate: Tom Blair

### **INTRODUCTION**

This report is an addendum to the Leachate Collection System (LCS) Site Safety Plan, and provides; 1) health and safety procedures for Montgomery Watson personnel during construction of landfill cap repairs, and 2) updated emergency information. The LCS Site Safety Plan is provided in the LCS Expedited Final Design Report, Volume II of II (Montgomery Watson, May 1997).

### **SCOPE OF WORK**

Additional scope of work covered by the LCS Site Safety Plan is as follows:

- Construction of landfill cap repairs

### **EMERGENCY INFORMATION**

Updated contacts, procedures and evacuation routes related to emergency conditions are provided on the following page.



## EMERGENCY INFORMATION

	<u>Address</u>	<u>Telephone</u>	<u>Contact Person</u>
Ambulance	<u>Central DuPage Hospital</u> <u>25 North Winfield Road</u> <u>Winfield, Illinois</u>	<u>911 or *999</u>	<u></u>
Hospital E/R	<u>Chicago</u>	<u>630/682-1600</u>	<u></u>
Poison Control	<u>Chicago</u>	<u>800/942-5969</u>	<u></u>
Police	<u></u>	<u>911 or *999</u>	<u></u>
Fire	<u></u>	<u>911 or *999</u>	<u></u>
Utilities	<u>J.U.L.I.E.</u>	<u>800/942-0123</u>	<u></u>
Chemtrec		800/424-9300	

**Note:** When using a mobile telephone \*999 only works on state highways. Otherwise dial "0" for operator assistance to direct you to the appropriate emergency service.

<b><u>Emergency Contacts</u></b>	<b><u>Name</u></b>	<b><u>Business Phone</u></b>	<b><u>Home Phone</u></b>
Project Manager	<u>Walter Buettner</u>	<u>630/691-5000</u>	<u>630/406-0962</u>
Project Engineer	<u>Tom Blair</u>	<u>630/691-5000</u>	<u>630/548-3074</u>
Site Safety Officer	<u>To be determined</u>	<u>                    </u>	<u>                    </u>
H&S Coordinator	<u>To be determine</u>	<u>                    </u>	<u>                    </u>
Corporate H&S Manager	<u>Beth Darnell</u>	<u>714/222-1844</u>	<u>NA</u>
Regional H&S Manager	<u>Mike Kierski</u>	<u>608/231-4747</u>	<u>608/544-4302</u>

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**CONSTRUCTION QUALITY ASSURANCE PLAN -  
ADDENDUM NO. 1**

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**ADDENDUM NO. 1  
CONSTRUCTION QUALITY ASSURANCE PLAN  
LANDFILL CAP REPAIRS**

**FOR THE**

**BLACKWELL LANDFILL  
DUPAGE COUNTY, ILLINOIS**

**Montgomery Watson File No. 1252008**

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**Prepared For:**

**DuPage County Forest Preserve District  
DuPage County, Illinois**

**Prepared By:**

**Montgomery Watson  
2100 Corporate Drive  
Addison, Illinois 60101**

**June 1997**



**MONTGOMERY WATSON**

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## SECTION 1.0 INTRODUCTION

A Construction Quality Assurance Plan (CQAP) was previously prepared as part of the Expedited Final Design Report for the Leachate Collection System (LCS) (Montgomery Watson, May 1997). The LCS CQAP addressed quality assurance (QA) during LCS construction, including field sampling activities such as inspections, sampling and testing, corrective action, and documentation. As well, the LCS CQAP contained the following information:

- Responsibilities and authorities of organizations and key personnel;
- Qualifications of the Quality Assurance Official;
- Protocols for sampling and testing used to monitor construction;
- Identification of proposed quality assurance sampling and monitoring activities; and
- Reporting requirements for CQA activities.

This Addendum No. 1 to the CQAP addresses modified or additional QA activities that will be conducted to document quality during Cap Repair construction. Modified QA activities include changes to the project organization, survey control and soil testing frequency, while additional QA activities include inspection of Cap Repair construction, clay borrow source testing, and an investigation to determine the extent of suitable landfill cap in selected areas on the landfill.

## **SECTION 2.0 PROJECT DESCRIPTION**

### **2.1 PROJECT OBJECTIVES AND SCOPE**

The objective of the Cap Repair is to provide a continuous, minimum 2 foot thick, low permeability soil cover over landfill refuse. The Cap Repair design drawings are presented in the Expedited Final Design Report.

The Cap Repair will consist of the following activities:

- Construction of a new landfill cover over 4 defined areas of the Blackwell Landfill. Existing topsoil will be excavated and stockpiled for later reuse;
- Placement of a new grading layer over one defined area of the landfill to promote better surface water drainage. Existing topsoil will be excavated and stockpiled for later reuse; and
- Replacement of topsoil and revegetation.

## **SECTION 3.0 RESPONSIBILITY AND AUTHORITY**

Modified responsibilities, qualifications and authority of key positions associated with site activities are detailed below. The Respondents and Regulatory Agencies have been previously described in the LCS CQAP. Descriptions of all other key positions are described below. These new descriptions supersede the descriptions provided in the LCS CQAP.

### **3.1 MONTGOMERY WATSON**

Montgomery Watson is the consultant for the FPD and is responsible for implementing the Design. Montgomery Watson Constructors, Inc. (MWCI) will function as the General Contractor (GC) during construction of the LCS and Cap Repairs.

#### **3.1.1 Montgomery Watson Project Manager**

The Montgomery Watson Project Manager is Mr. Walter Buettner, P.E. He has the overall responsibility for meeting U.S. EPA objectives and Montgomery Watson's quality standards. In addition, he is responsible for technical quality control and project oversight. The Montgomery Watson Project Manager will:

- Define project objectives and develop a detailed schedule.
- Acquire and apply technical and corporate resources as needed for project performance within budget and schedule constraints.
- Orient field leaders and support staff concerning the project's special considerations.
- Monitor and direct the field leaders.
- Review the work performed on each task for its quality, responsiveness, and timeliness.
- Review and analyze overall task performance with respect to planned requirements and authorizations.
- Approve external reports (deliverables) before their submission to the U.S. EPA.
- Ultimately be responsible for the preparation and quality of reports.
- Represent the project team at meetings and public hearings.



### **3.1.2 Montgomery Watson Project Engineer**

The Montgomery Watson Project Engineer is Mr. Tom Blair, P.E. He will be assisted by Mr. Dean Free, P.E. on the LCS component of the design and construction. Mr. Blair is responsible for performing the engineering design and preparing the associated drawings, plans, specifications (including performance specifications) and reports, and ensuring that construction is constructed in accordance with the design plans and specifications. The Project Engineer is responsible for interpretation of the design, drawings, and specifications; for approving all design and specification changes (with concurrent U.S. EPA approval) and making necessary design clarifications.

The Engineer will attend the preconstruction meeting, prefinal inspection, and final inspection, as discussed in the LCS CQAP. The Engineer is also responsible for submittal of the following documentation to the FPD:

- Design drawings and specifications.
- Documentation of approved design changes.
- Progress reports.
- Completion of Construction Report.

### **3.1.3 MWCI Construction Manager**

The MWCI Construction Manager is Mr. John McDonough. He is responsible for construction of the LCS and Cap Repairs, and will coordinate all construction activities performed on site. Mr. McDonough is also responsible:

- The construction schedule;
- Ensuring that construction is constructed in accordance with the design plans and specifications;
- Maintaining daily reports of construction work performed, including problems encountered and resolved
- Submittal of daily construction reports to the Engineer; and
- Submitting approved invoices, request for payment, and change orders to the Engineer.

Mr. McDonough will attend the preconstruction meeting, prefinal inspection, and final inspection.

### **3.1.4 MWCI Construction Superintendent**

The MWCI Construction Superintendent has not yet been selected. The Construction Superintendent will report directly to the Construction Manager and will be responsible for:

- Observing and documenting construction in sufficient detail and with sufficient continuity, to provide a high level of confidence that the construction complies with the design plans and specifications. This will be closely coordinated with the Project Engineers.
- Documenting that installation requirements are met and that submittals are provided.
- Maintaining daily reports of quality control activities. These reports will include, at a minimum, visual observations, test results and summaries of significant events.
- Documenting problems encountered and their resolution.

## **3.2 CQA AND LABORATORIES**

### **3.2.1 Geotechnical Laboratory**

The geotechnical laboratory is a firm, independent of the FPD, the Engineer and the earthwork Contractor, responsible for conducting tests on soil samples. Test procedures will be conducted in accordance with the test methods outlined in the construction specifications and this CQAP. The geotechnical laboratory is responsible for providing report-ready test results.

The geotechnical laboratory is:

Testing Service Corporation  
457 East Gundersen Drive  
Carol Stream, IL 60188

The geotechnical laboratory will have an acceptable program for maintaining and calibrating testing equipment. The geotechnical laboratory will demonstrate that laboratory testing is performed by personnel with experience and/or training in soil testing fundamentals and familiarity with American Society for Testing and Materials (ASTM) test standards. The geotechnical laboratory will be capable of providing test results in a timely manner to meet project needs.

The geotechnical laboratory will submit test results to the Project Engineer within agreed upon time frames. Written test results will be in an easily readable format and include references to the ASTM method used.

### 3.2.2 Analytical Laboratory

If necessary, analysis of waste/refuse for waste characterization by TCLP, will be the responsibility of the contracted solid waste disposal facility and its hauler. If the contracted facility does not perform its own analyses, the work will be performed by:

First Environmental  
1600 Shore Road  
Naperville, IL 60563  
(708) 778-1200

Laboratory Data and QC responsibility will be managed as follows:

- Analytical protocol specified - First Environmental
- Review of analytical protocol - First Environmental QAO
- Review of field and laboratory analytical procedures - U.S. EPA QAS
- Internal QA/QC - First Environment QAO
- Final data review-chemist (external to the laboratory) - Montgomery Watson
- Review of tentatively identified compounds and assessment of need for confirmation - chemist - Montgomery Watson

Performance and Systems Audits responsibilities will be managed as follows:

#### Field Operations

- Internal Audits - Montgomery Watson
- External Audits - to be conducted at the discretion of the U.S. EPA.

#### Analytical Laboratories

- Internal Audits - First Environmental Laboratory and Testing Service Corporation-QAO's
- External Audits - to be conducted at the discretion of the U.S. EPA

#### Final Evidence File

- Final Evidence File Audits - Montgomery Watson

## **SECTION 4.0 CONSTRUCTION QUALITY ASSURANCE ACTIVITIES**

### **4.1 CAP REPAIR**

The Cap Repair installation includes the components listed in previous Section 2.0. Refer to the Design, Specifications, and Figures in the Expedited Final Design for additional information.

### **4.2 OBSERVATION AND INSPECTION**

The Construction Superintendent will be present on-site full-time during construction of Cap Repairs to document fill placement and compaction activities, maintain daily field notes regarding construction and oversee that construction is in accordance with the Design plans and Specifications.

The Geotechnical Laboratory will be responsible for the following activities:

- Perform field density tests on each lift of compacted soil; and
- Collect clay samples for laboratory testing for imported off-site clay, if necessary.

### **4.3 CONSTRUCTION TESTING AND MATERIAL QUALITY CONFIRMATION**

The Construction Superintendent will visually observe the general fill soil and topsoil to document that unsuitable soil is not used during construction, and that maximum particle size is as specified for these materials. If not already performed, the Geotechnical Laboratory will also conduct Standard Proctor Density, grain size distribution, Atterberg Limit, and hydraulic conductivity tests on clay material from each borrow source, at a rate of one set of tests for each 5,000 cubic yards of material used, or any change in the borrow source. Samples will be representative of the material placed. Copies of all tests for classification will be furnished to the Engineer for approval prior to placement of the material.

The Contractor will submit to the Engineer manufacturer's literature discussing physical characteristics, application and installation instructions for erosion control material. The earthwork Contractor will also submit certificates of compliance stating that materials meet the requirements of the construction specifications. The Construction Superintendent will visually inspect the seed, topsoil, and fertilizer once the material has arrived on site.

#### **4.4 LIMITS OF CAP CONTINUITY INVESTIGATION**

Prior to construction, the Engineer will undertake an investigation to define the edges of the Cap Repair areas where the thickness of the existing landfill cover is inadequate. The edges of landfill refuse within the Cap Repair areas have already been defined in the Predesign Investigation Report. The investigation will begin at the approximate edge of the Cap Repair Areas, as defined in the Predesign Investigation Report, at approximately 100 foot intervals. Soil borings, hand augered holes or test pits will be augered or excavated, and the thickness of adequate existing landfill cover will be documented. Additional soil borings, hand augered holes or test pits will be augered or excavated inward or outward as appropriate until the edge of suitable landfill cap material has been identified within about 10 feet.

Within the areas with a suitable landfill cover, boreholes will be backfilled with bentonite powder, chips or pellets. Testpits, if used, will be backfilled with excavated clay that is compacted to a reasonable extent by the excavation equipment.

All information gathered during the investigation will be documented, and included as part of the final Construction Report.

#### **4.5 OBSERVATION, INSPECTION AND TESTING**

The Project Engineer will periodically be on site during construction of the Cap Repairs to document that it is constructed in accordance with the Construction Specifications, and that grading at the Site conforms to the contours shown on the Construction Drawings. The Construction Superintendent will maintain daily field notes regarding project construction, as well as a photographic record, to document construction activities.

##### **4.5.1 Topsoil**

Existing topsoil will be excavated from the Cap Repair areas, and temporarily stockpiled on site for later reuse. The topsoil has been observed to grow an adequate vegetative cover, and therefore will not be tested for nutrient analysis.

##### **4.5.2 Clay Material**

Clay material will be placed on the Cap Repair areas in six- to eight-inch thick lifts. Each lift will be fully compacted to the specified density and moisture content, prior to placement of the next lift.

The calibration checks of both the density and moisture gauges will be made at the beginning of a job, on each different type of material encountered, and at intervals as

directed by the Engineer. One test will be made for each 5,000 square yards or less for each lift of specified depth for each layer of material placed. Additional tests will be made as necessary. All test results will be made available to the Contractor. Acceptance tests may be made by the Contractor for verification of compliance; however, the Engineer's test results of earthwork will be the basis for compaction control. Deficiencies in construction will be corrected by the Contractor.

#### **4.5.3 Vegetative Cover**

The Contractor will submit to the Engineer a list of proposed seeding and mulching equipment to be used in performance of the seeding operation, including descriptive data and calibration tests.

#### **4.5.4 Confirmation of Grading**

Prior to and following Cap Repairs, the Cap Repair portions of the landfill cover will be surveyed to confirm that grading conforms to the contours shown on the Construction Drawings and that adequate thickness of clay cap is achieved.

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**QUALITY ASSURANCE PROJECT PLAN -  
ADDENDUM No. 2**



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**ADDENDUM NO. 2  
QUALITY ASSURANCE PROJECT PLAN  
LANDFILL CAP REPAIRS**

**FOR THE**

**BLACKWELL LANDFILL  
DUPAGE COUNTY, ILLINOIS**

**Montgomery Watson File No. 1252008**

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**Prepared For:**

**DuPage County Forest Preserve District  
DuPage County, Illinois**

**Prepared By:**

**Montgomery Watson  
2100 Corporate Drive  
Addison, Illinois 60101**

**June 1997**



**MONTGOMERY WATSON**

## **1.0 INTRODUCTION**

A Quality Assurance Project Plan (QAPP) was previously prepared as part of the Predesign Investigation Work Plan (Montgomery Watson, August 1996). This QAPP presented the organization, objectives, functional activities, and specific quality assurance (QA) and quality control (QC) activities associated with the Pre-Design Investigation Work Plan for the Blackwell Landfill. The QAPP also described the specific protocols which will be followed for sampling, sample handling and storage, chain of custody, and laboratory and field analyses.

Addendum No. 1 to the August 1996 QAPP was prepared as part of the Expedited Final Design Report for the Leachate Collection System (LCS) construction (Montgomery Watson, May 1997), and provided additional details associated with the proposed LCS.

This Addendum No. 2 has been prepared to provide the additional quality assurance and quality control activities associated with construction of the cap repairs. In providing these details, Addendum No. 2 will completely supersede Addendum No. 1. Complete information is available in the August 1996 QAPP.

## **2.0 QUALITY ASSURANCE PROJECT PLAN**

All information presented in the August 1996 QAPP is applicable to the landfill Cap Repair design submittal, with additional information presented below.

### **2.1 PARAMETERS TO BE TESTED AND FREQUENCY**

A summary of sample matrices, analytical parameters, and frequencies of sample collection can be found in Table G-1. A summary of sample volume, bottle, preservative, and packaging requirements is provided in Table G-2.

### **2.2 DATA QUALITY OBJECTIVES**

Refer to Table G-3 for a summary of data generating activities and associated data quality objectives.

### **2.3 PROJECT SCHEDULE**

A schedule of Cap Repair construction activities is presented in the Expedited Final Design Report for Cap Repairs.

### **2.4 PROJECT ORGANIZATION AND RESPONSIBILITY**

Refer to the CQAP (Appendix D of the Expedited Final Design Report for Cap Repairs) for project organization and responsibility information.

### **2.5 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA**

The number of duplicate and field blank samples to be collected are listed in Table G-1. Sampling procedures are specified in the CQAP. The level of QC effort provided by the laboratory will be equivalent to the level of QC effort specified in Table 3-2 of the August 1996 QAPP.

### **2.6 SAMPLING PROCEDURES**

Sampling and testing procedures for the clay samples are further described in the Cap Repair Design and the CQAP. Soil samples collected for the cap repairs will be analyzed by Testing Service Corporation (TSC). Refer to Table G-1 for matrices; parameters, and laboratories performing the analysis. Refer to the August 1996 QAPP for additional information.

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**TABLE G-1**

**Sampling Plan  
Final Design Blackwell Landfill/ DuPage County Forest Preserve District  
DuPage County, Illinois**

<u>Matrix</u>	<u>Lab<sup>(2)</sup></u>	<u>No. of Samples<sup>(7)</sup></u>	<u>Field Duplicates<sup>(4)</sup></u>	<u>Field Blank<sup>(5)</sup></u>	<u>Total No. Samples</u>	<u>Laboratory Parameters<sup>(2)</sup></u>	<u>Field Parameters</u>
Waste Characterization	First Envir.	Unknown	Unknown	Unknown	Unknown	TCLP <sup>(1)(3)</sup>	HNu (11.7 eV)
Compacted Clay  (borrow, off-site)	TSC	Unknown	None	None	2 Min.	Standard Proctor, Grain Distribution Size, Atterberg Limits, Hydraulic Conductivity	None
Compacted Clay (all backfill)	--	Unknown	None	None	Unknown	--	Field Density (Troxler)

General Notes:

1. Unless otherwise noted, samples will be considered low concentrations, and will be packaged and shipped accordingly.
2. Lab address and telephone number:
  - First Environmental Laboratories (First Envir.)  
1600 Shore Road  
Naperville, IL 60563 (708) 778-1200
  - Testing Service Corp. (TSC)  
457 East Gundersen Drive  
Carol Stream, IL 60188 (708) 462-2600
3. A trip blank for TCL VOC analysis will be included with each cooler shipped. Trip blanks are not included in the total number of samples.
4. Field duplicates will be collected at a ratio of one field duplicate for each 10 investigative samples collected.
5. Field blanks will be collected at a ratio of one field blank for each 10 investigative samples collected.
6. Refer to Table 7-1 for method reference. Refer to Table 1-2 for sample volume and preservation requirements (August 1996 QAPP).
7. Number of samples is approximate. Actual numbers are based on field observations.

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**TABLE G-2**

**Sample Quantities, Containers, Preservatives, and Packaging Requirements  
Final Design Blackwell Landfill/DuPage County Forest Preserve  
DuPage County, Illinois**

<u>Analysis</u>	<u>Bottles &amp; Jars</u>	<u>Preservation</u>	<u>Holding Time<sup>(1)</sup></u>	<u>Volume</u>	<u>Shipping</u>	<u>Packaging<sup>(2)</sup></u>
<b>Waste Characterization</b> TCLP VOCs	4-oz. vials	Iced to 4°C	14 days from sampling date	Fill completely, no headspace	Shipped overnight carrier	Vermiculite
TCLP SVOCs, Metals, Corrosivity, Reactivity, Flammability	Two 1-qt amber glass bottles	Iced to 4°C	14 days from sampling date	Fill to shoulder of bottle	Shipped overnight carrier	Vermiculite
<b>Clay Soils</b> Standard Proctor, Grain Size Distribution, Atterberg Limits, Hydraulic Conductivity	25-lb, sample bag	None	None	Full	Shipped overnight carrier	Vermiculite

General Notes:

1. Holding time begins at the time the sample is collected.
2. The packaging material should completely cushion the sample bottles - bottom, sides, and top.

**TABLE G-3**

**Summary of Data Generating Activities and Associated Quality Objectives  
Leachate Collection System - Blackwell Landfill/DuPage County Forest Preserve  
DuPage County, Illinois**

<u>Activity</u>	<u>Description</u>	<u>Intended Data Usages</u>	<u>Parameter</u>	<u>Data Quality Objective</u>	<u>Number of Samples</u>
Waste Characterization	Collect a composite refuse sample if to be disposed of off-site	Determine character of waste	TCLP VOCs, SVOCs, Herbicides, Pesticides, metals, pH, cyanide, sulfide, flash pt., paint filter test		See Table G-1
Compacted Clay	Clay Borrow Sampling verification during placement	Assess quality of imported clay and placement	Standard Proctors, Grain Size, Atterberg Limits and Hydraulic Conductivity	2	See Table G-1

## General Notes:

1. Refer to Tables G-1 and G-2 for parameter lists and required detection limits.
2. Additional testing may be required by the waste facility selected to receive the waste.

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**CAPITAL COST ESTIMATE**



BLACKWELL FOREST  
PRESERVE LANDFILL  
LANDFILL CAP REPAIR

CONSTRUCTION  
COST ESTIMATE

<u>Description</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Total</u>
Engineering & Construction Management/QA	1	LS	\$ 40,000.00	\$ 40,000
Quality Control	1	LS	\$ 5,000.00	\$ 5,000
Mobilization/Demobilization	1	LS	\$ 25,000.00	\$ 25,000
Surveying	1	LS	\$ 15,000.00	\$ 15,000
Erosion Control	1	LS	\$ 6,000.00	\$ 6,000
Clear and Grub	4	Acre	\$ 3,500.00	\$ 14,000
Site Preparation	4	Acre	\$ 1,500.00	\$ 6,000
Strip Topsoil	3222	CY	\$ 5.50	\$ 17,721
Relocate Soils	1	LS	\$ 45,000.00	\$ 45,000
Placement of Clay Cap	12900	CY	\$ 6.00	\$ 77,400
Restore Asphalt Paving	1	LS	\$ 14,500.00	\$ 14,500
Adjust Manhole	1	LS	\$ 5,000.00	\$ 5,000
Place Topsoil	3222	CY	\$ 5.50	\$ 17,721
Seed	4	Acre	\$ 2,500.00	\$ 10,000
Supply Extra Topsoil	50	CY	\$ 15.00	\$ 750
Supply Clay	0	CY	\$ 5.00	\$ -
<b>Subtotal</b>				<b>\$ 299,092</b>
<b>10% Contingency</b>				<b>\$ 29,909</b>
<b>TOTAL</b>				<b>\$ 329,000</b>

**FIGURE 4**  
**AREAS REQUIRING CAP REPAIR**

**MAY BE VIEWED AT**

**U.S. EPA REGION 5  
77 W. JACKSON BLVD.  
CHICAGO, IL 60604-3590**

**FIGURE 6**  
**CAP REPAIR GRADING PLAN**

**MAY BE VIEWED AT**

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**77 W. JACKSON BLVD.**  
**CHICAGO, IL 60604-3590**